

FLIGHT MANUAL

USAF SERIES

F-100D (I) F-100F (I)

(HIGH WIRE)

-2, -6, -11, -16, -20

(HIGH WIRE)

AIRCRAFT

This change replaces Operational Supplements 1F-100D(I)-1S-29-31 and Safety Supplement 1F-100D(I)-1SS-30.

This publication is incomplete without Performance Data Manual, T.O. 1F-100D(I)-1.

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



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100F-1-A00-1P

31 JULY 1973
CHANGE 5 - 15 SEPTEMBER 1978

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 DESTROY SUPERSEDED PAGES.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 margin of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:

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NOTE

PERFORMANCE DATA NORMALLY INCLUDED IN APPENDIX I IS CONTAINED IN T.O. 1F-100C(11-1-1) FOR THE F-100 SERIES AIRPLANES.

SUPER SABRE 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. The following publications cover flight operations of the F-100 Series Airplanes.

T.O. 1F-100C(I)-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(I)-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 late F-100D Airplanes and F-100F Airplanes that went through "Project High Wire."

T.O. 1F-100D(I)-1-2. This publication is a classified supplement and covers F-100 Series Airplanes.

In addition, T.O. 1F-100A-1, 1F-100A-1CL-1, 1F-100A(I)-1, 1F-100A(I)-1CL-1, 1F-100C(I)-1, and 1F-100C(I)-1CL-1 cover the F-100A and F-100C Series Airplanes.

"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 PDM operation.

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

The heavy-maintenance and PDM 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.

PERMISSIBLE OPERATIONS

The Flight Manual takes a "possible 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.

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-100C(I)-1-1 for the F-100 Series Airplanes.

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

HOW TO BE ASSURED OF HAVING LATEST DATA

Refer to T.O. 0-1-1-4A, which lists all current Flight Manuals, Safety Supplements, Operational Supplements, and Checklists. Its frequency of issue and brevity insures an accurate, up-to-date listing of these publications.

SYSTEM LIMITS AND TOLERANCES

In some cases, the limits and tolerances presented in the Flight Manual are not precisely identical to those presented in the System Maintenance Manuals. The numerical values in the Flight Manual are to be used as operating guides by flight personnel.

DEFINITIONS OF WORDS "SHALL," "WILL," "SHOULD," AND "MAY"

The words "shall" and "will" indicate a mandatory requirement. The word "should" indicates a non-mandatory desire or preferred method of accomplishment. The word "may" indicates an acceptable or suggested means of accomplishment.

SUPPLEMENTS

The current status of each Supplement affecting your airplane can be determined by referring to T.O. 0-1-1-4A. The title page of the Flight Manual and the title block of each Supplement should be checked to determine the effect they may have on existing Supplements. You must remain constantly aware 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 Supplement, file it in the front of your Flight Manual. If existing Flight Manual information or procedures are revised, a reference to the applicable Supplement should then be written in the margin of the page opposite the affected write-up. A Safety Supplement may be replaced by an Operational Supplement or an Operational Supplement may be replaced by a Safety Supplement.

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.

OPERATIONAL SUPPLEMENTS. Non-safety requirements or airplane changes affecting flight crew information that can not be timely, practically, or adequately covered in the Flight Manual at the time of a scheduled change or revision will be forwarded to you by Operational Supplements.

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 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 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, Operational 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. 0-1-1-4). 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.

CHANGE SYMBOL

The change symbol, as illustrated by the black line in the margin of this paragraph, indicates text changes made to the current revision.

ILLUSTRATIONS CHANGES

To help you more easily find on illustrations the technical changes that otherwise might be inconspicuous, the following identifier will be used.

WARNINGS, CAUTIONS, AND NOTES

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

WARNING

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

CAUTION

Operating procedures, techniques, etc., which will 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 recommending changes to the Flight Manual in accordance with instructions in AFR 60-9 and T.O. 00-5-1. These will be forwarded through Command Headquarters to Sacramento ALC, McClellan AFB, CA 95652, ATTN: MMEAH. Technical content of the Flight Manual is the responsibility of the Flight Manual Manager (MMEAH), and all comments and questions transmitted by means other than the AF Form 874 will be submitted directly to the Flight Manual Manager, Sacramento ALC, McClellan AFB, CA 95652, ATTN: MMEAH.

SUPPLEMENT SUMMARY

Safety Supplements are numbered as follows: ISS-1, ISS-2, etc. Operational Supplements are numbered OS-1, OS-2, etc. The supplements you receive should follow in numerical sequence, and if you find you are missing one, check T.O. 0-1-1-4 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.

SUPPLEMENTS REPLACED BY THIS CHANGE OR RESCINDED

NUMBER	DATE	SHORT TITLE	DISPOSITION (SECTION)
S-1	15 Jun 74	LAU-3/D Rocket Launcher	V
SS-2	6 Feb 74	AAU-19 Altimeter Crosscheck	II
S-3	8 Feb 74	LAU68/A	V
S-4	25 Jul 74	Afterburner Malfunctions	II
SS-5	4 Nov 74	BAK-12 Engagement Restrictions	III
SS-6	6 Nov 74	Throttle Restriction	Rescinded
SS-9		AIMS Malfunction	II
SS-10		Flight Control Malfunction	III

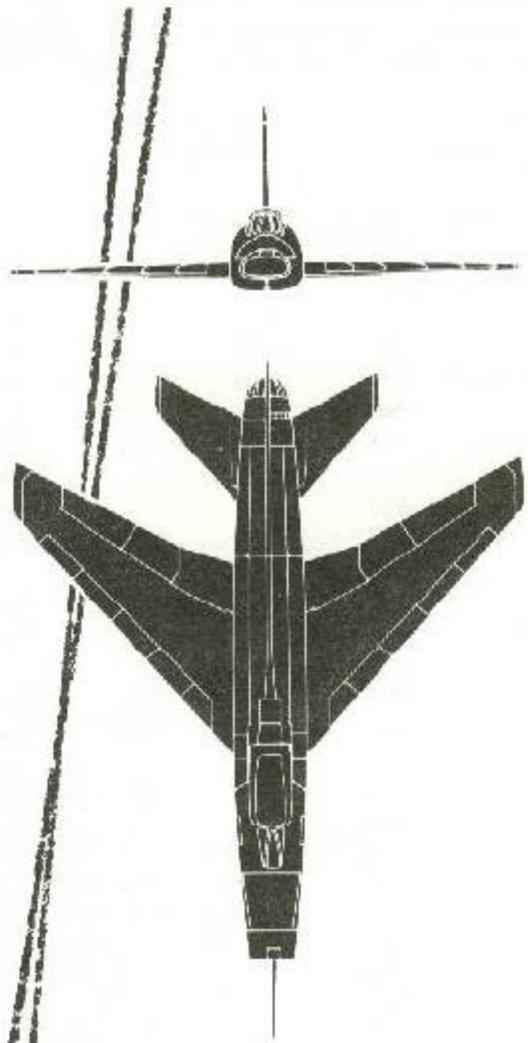
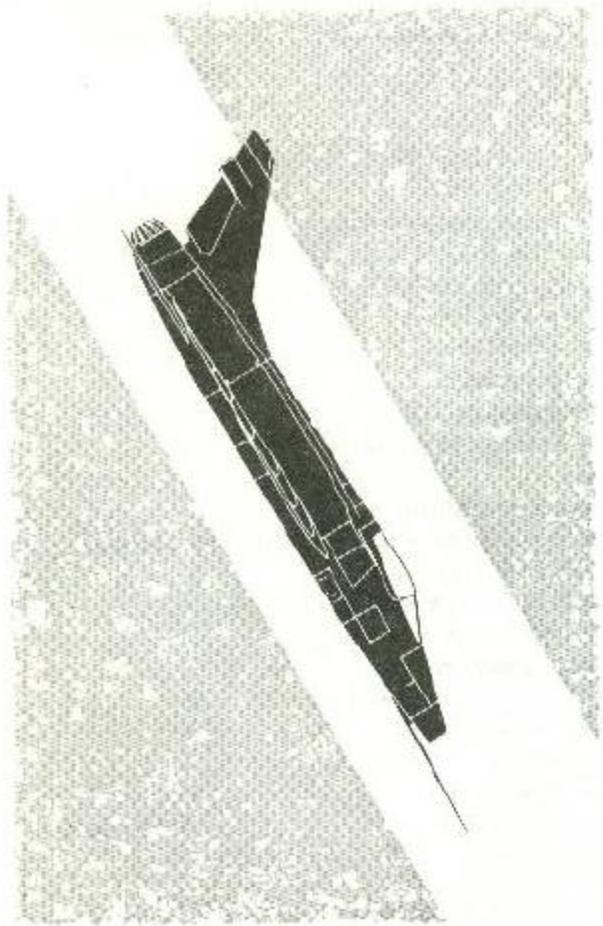
ACTIVE SUPPLEMENTS

NUMBER	DATE	SHORT TITLE
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The following T.C.T.O.'s, affecting F-100D and F-100F Airplanes, are covered in this manual. This is not a complete listing, and only includes T.C.T.O.'s listed by number in this manual. Refer to the Basic Index (T.O. 0-1-1-4) for the complete listing of T.C.T.O.'s for these airplanes.

T.O. NUMBER	DISPOSITION (SECTION)	SUBJECT
1F-100D	-627	IV Installation of combat documentation cameras
	-630	IV Installation of seek silence system
	-632	IV, V Modification of armament equipment
	-632D	IV Bypass adapter and single store release
	-648	I, IV Instrument Modification F-100D
1F-100F	-562	I, III Installation of canopy lock handle
	-566	IV Installation of secure speech capability
1F-100	-956	IV (Rescinded) Installation of variable intensity light control
	-959	I, II, III Deletion of autopilot
	-965	I Standardization of fire warning system
	-967	I Installation of fuel boost pump test switch and light. Two aircraft, DSN 56-3972 and FSN 58-1214
	-969	IV Installation of AN/ARA-50 UHF DF system
	-977	IV Installation of KA-71A or KB-18A strike camera
	-985	IV Installation of radar beacon system
	-992	IV Installation of RHAW system wiring provisions
	-994	IV Installation of RHAW system components
	-1001	IV Installation of relay in gun camera circuitry
	-1010	II, IV Installation of exterior floodlights
	-1031	I, IV Installation of Data Recording System
	-1040	I, II, IV Installation of anticollision lights
	-1050	I, IV Relocation of Sight Selector Unit
	-1056	I, II, III Installation of DART/Stubber Ejection Seat
	-1062	I, II, IV Installation of AIMS F-100D/F
	-1064*	I, II, III Installation of Single Motion Ejection Initiation System, F-100D/F
	-1068	IV Installation of External Light Dimmer Control
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	-1084*	I, III Installation of Ballistic Powered Inertia Reels on F-100D/F Aircraft Ejection Seats
	-1103*	I Installation of Ejection Seat Adjustment Limit Switch F-100D/F Aircraft

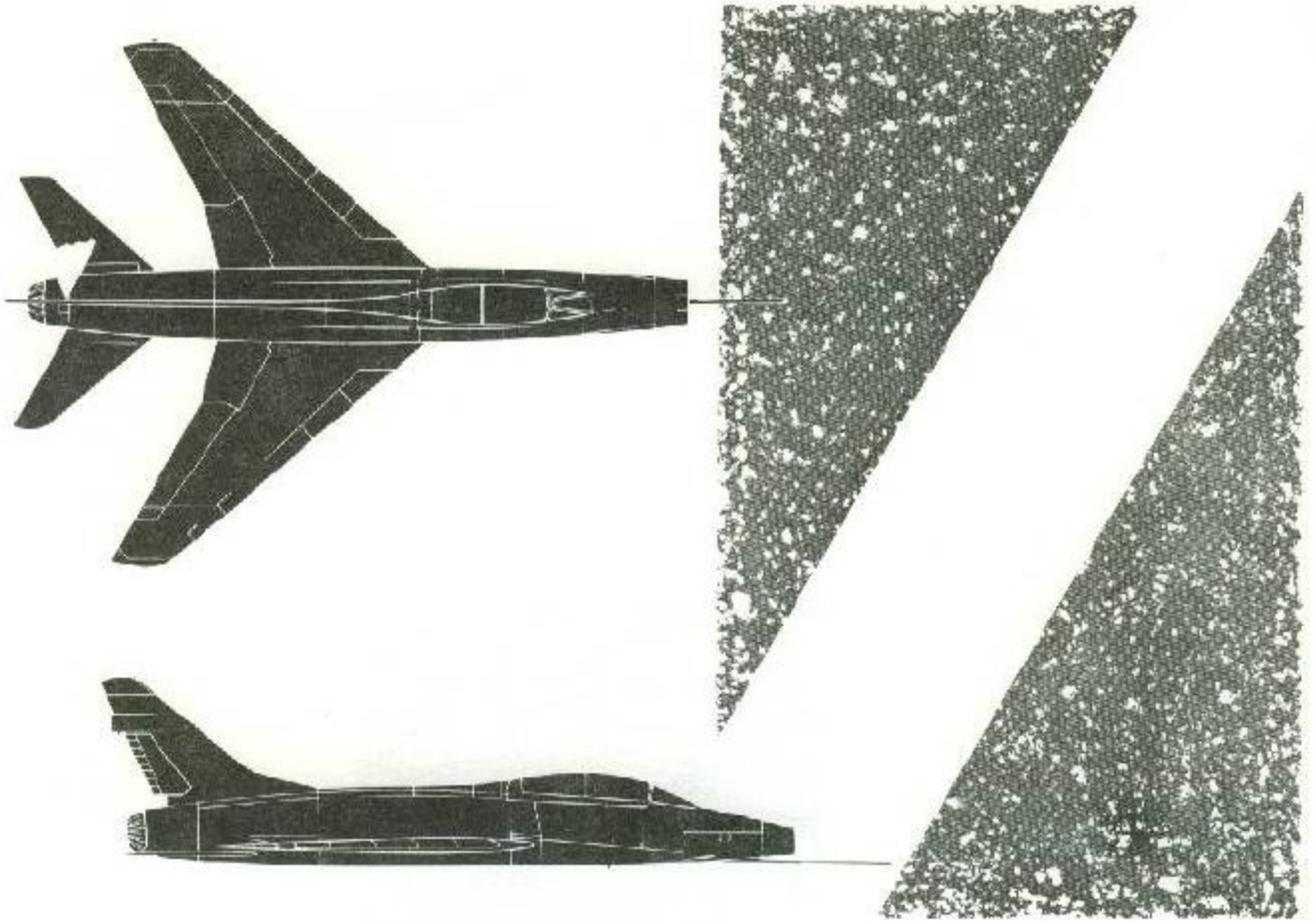
*Prime at SAMMA



F-100D



100-1A22-14



F-100F



100F-A-33211

DESCRIPTION



F-100D-1-4-41

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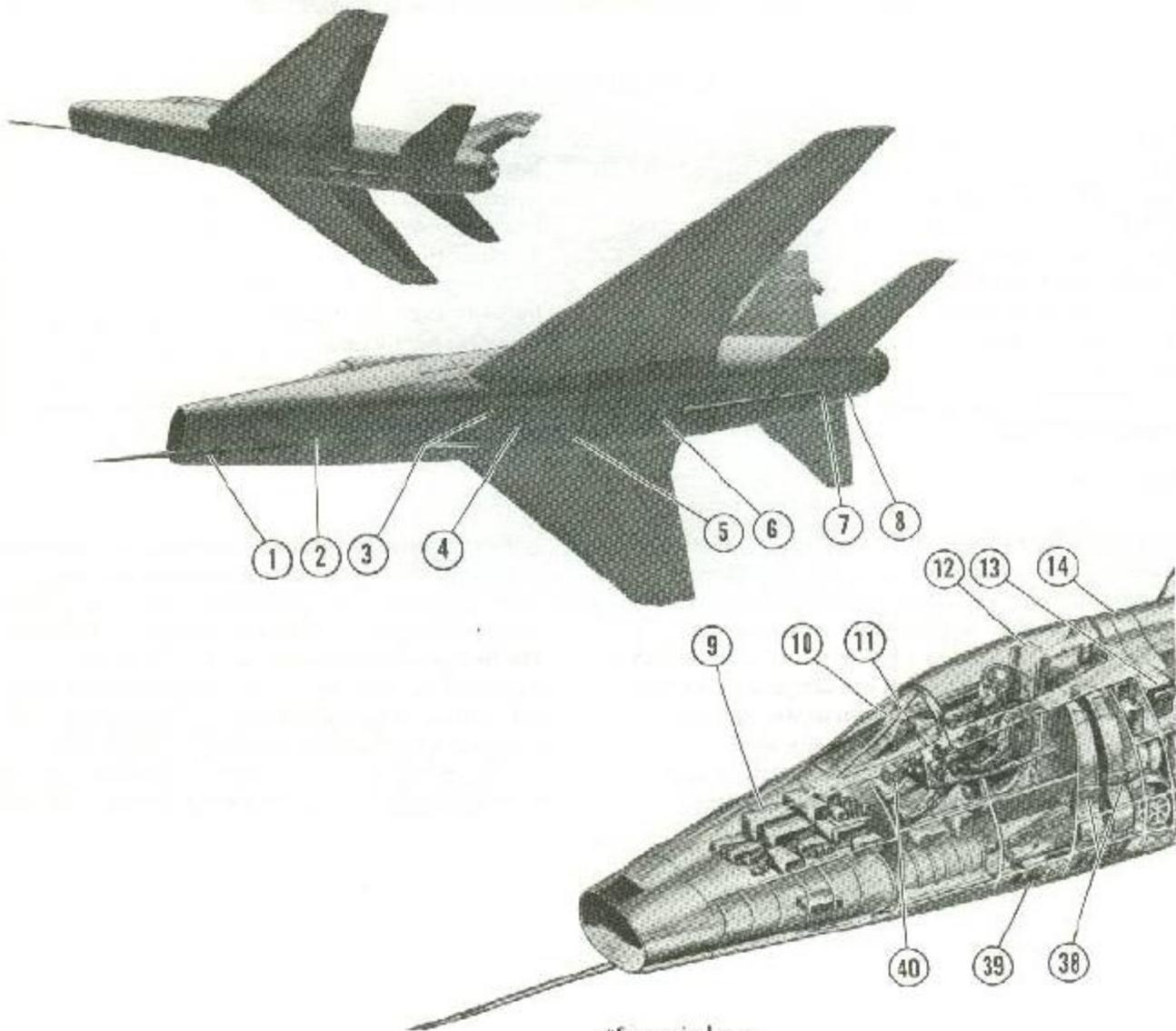
AIRPLANE.

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 version of the F-100D and is also used as a pilot trainer. The F-100A was the first in this series which was designed for an "air superiority" role and was first flown in May of 1953. The F-100C was a fighter-bomber version with strengthened wing, additional underwing stations and wing fuel. These features and an in-flight refueling

system increased its capability from local air superiority to long range fighter-bomber penetration or escort missions. The F-100C was first flown in January 1956. The first two-place F-100 was a converted F-100C-20. The first production F-100F was first flown in August 1956. Both have a 45-degree swept-back wing with automatic slats on the leading edge, and flaps on the inboard trailing edge. Some airplanes have an aerodynamic fence on each wing that provides an increase in lateral stability at high speeds and altitudes. All control

GENERAL ARRANGEMENT F-100D AIRPLANES

- | | |
|---|---|
| <ol style="list-style-type: none"> 1. FOLDING PITOT-STATIC BOOM 2. RECOGNITION LIGHT* 3. LANDING LIGHTS 4. RECOGNITION LIGHT (ANTICOLLISION LIGHT*) 5. SPEED BRAKE 6. EXTERNAL POWER RECEPTACLES (ELECTRICAL AND STARTER AIR SUPPLY) 7. ARRESTING HOOK | <ol style="list-style-type: none"> 8. RETRACTABLE TAIL SKID 9. FORWARD ELECTRONIC EQUIPMENT COMPARTMENT 10. A-4 SIGHT 11. GUN CAMERA 12. EJECTION SEAT 13. BATTERY 14. RECOGNITION LIGHT |
|---|---|



*Some airplanes

Figure 1-1 (Sheet 1 of 2)

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|--|--|
| 15. RAM-AIR TURBINE EXHAUST DOOR | 28. POSITION LIGHT |
| 16. ANTICOLLISION LIGHT* | 29. FLOODLIGHT |
| 17. WING FENCE | 30. WING SLATS |
| 18. J57 ENGINE WITH AFTERBURNER | 31. AFT FUEL TANK |
| 19. POSITION LIGHTS | 32. INTERMEDIATE FUEL TANK |
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| 21. TWO-POSITION EXHAUST NOZZLE | 34. WING FUEL TANK |
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| 25. SINGLE-POINT REFUELING RECEPTACLE | 38. AMMUNITION BOXES |
| 26. WING FLAP | 39. M-39 20 MM GUNS |
| 27. AILERONS | 40. LIQUID OXYGEN CONVERTER |

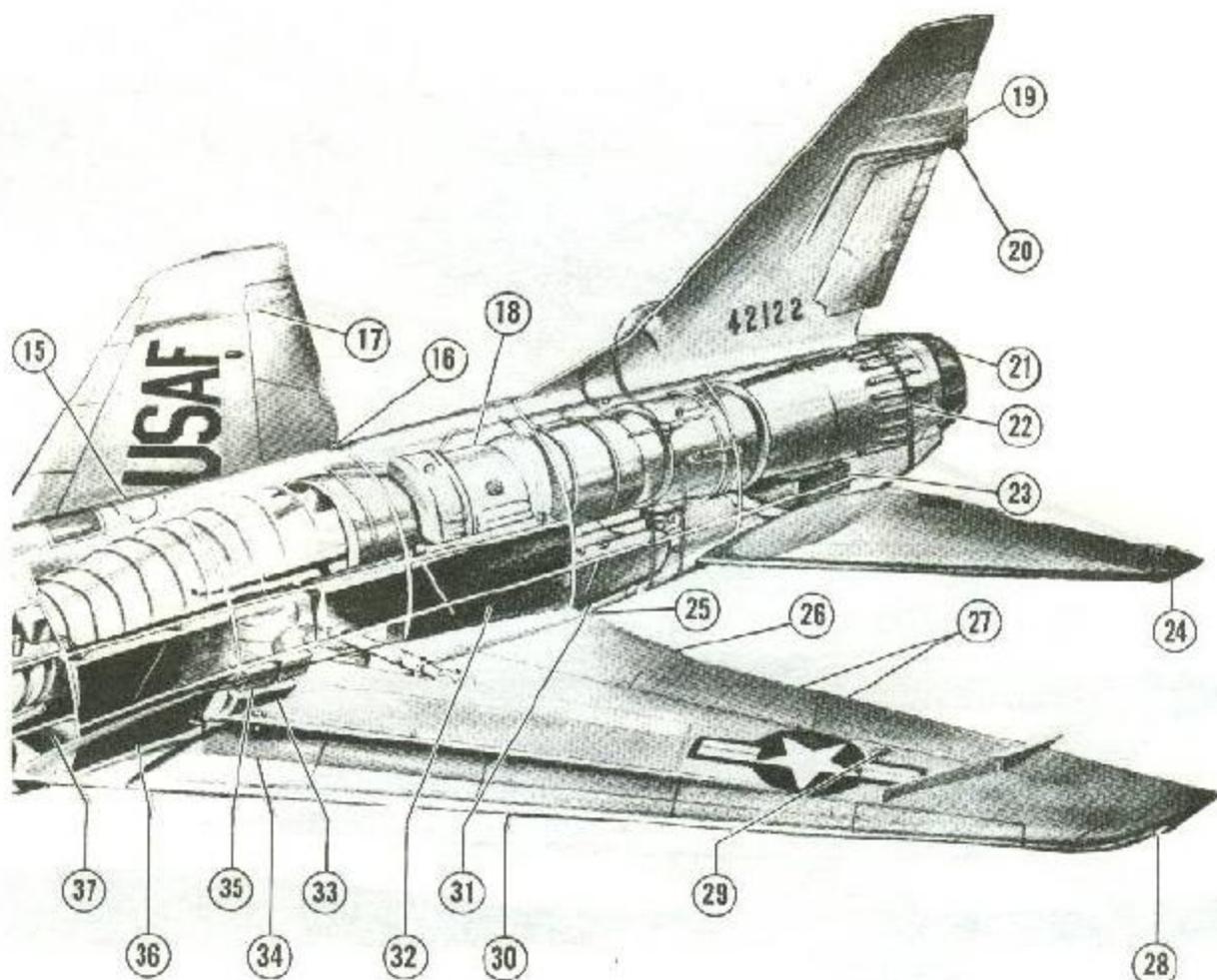
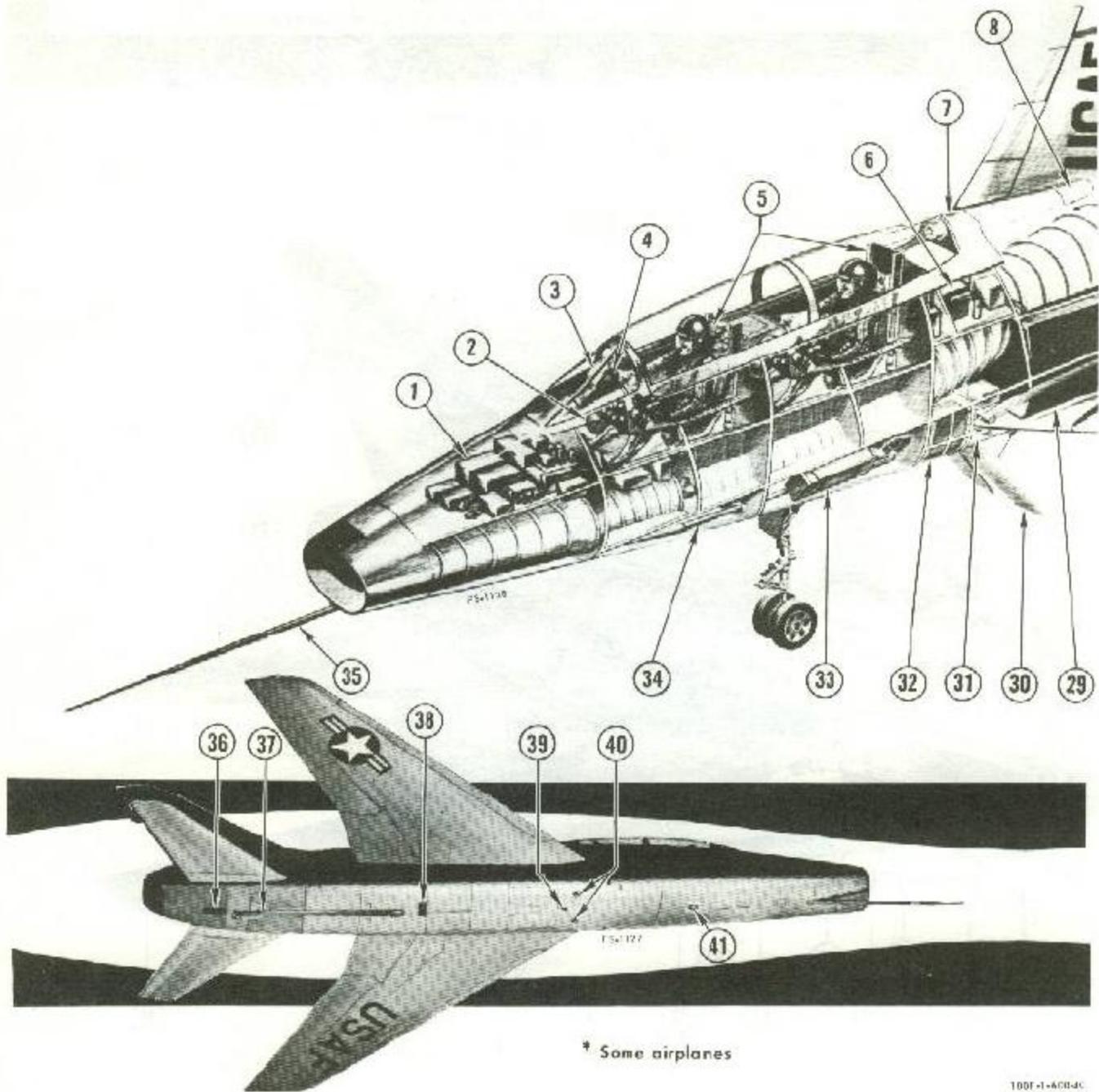


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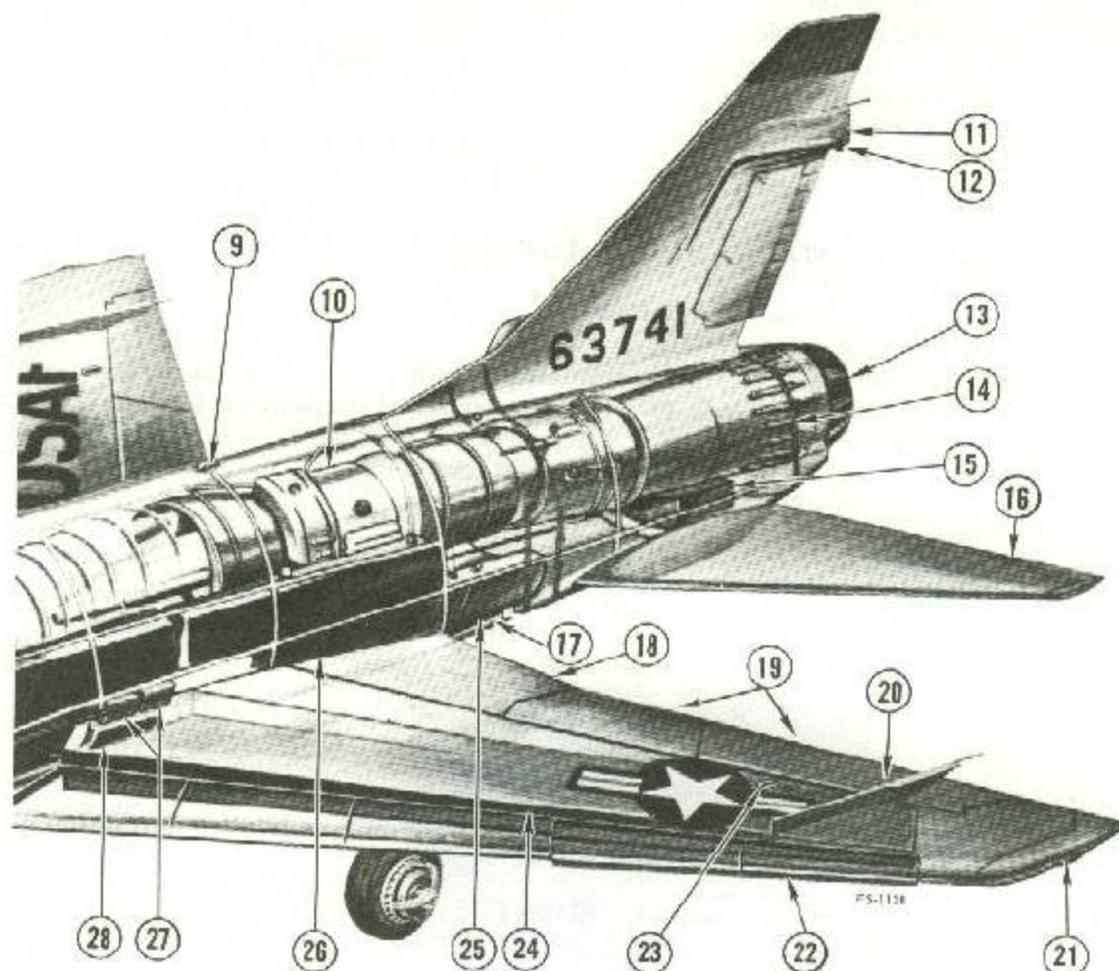
GENERAL ARRANGEMENT F-100F AIRPLANES



* Some airplanes

100F-1-A00-40

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- | | |
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| 1. FORWARD ELECTRONIC EQUIPMENT COMPARTMENT | 22. WING SLATS |
| 2. LIQUID OXYGEN CONVERTERS | 23. FLOODLIGHT |
| 3. A-4 SIGHT | 24. WING FUEL TANK |
| 4. GUN CAMERA | 25. AFT FUEL TANK |
| 5. EJECTION SEATS | 26. INTERMEDIATE FUEL TANK |
| 6. BATTERY | 27. FORWARD FUEL TANK (CENTER CELL) |
| 7. RECOGNITION LIGHT | 28. FORWARD FUEL TANK (LOWER CELL) |
| 8. RAM-AIR TURBINE EXHAUST DOOR | 29. FORWARD FUEL TANK (UPPER CELL) |
| 9. ANTICOLLISION LIGHT* | 30. SPEED BRAKE |
| 10. J57 ENGINE WITH AFTERBURNER | 31. AFT ELECTRONIC EQUIPMENT COMPARTMENT |
| 11. POSITION LIGHTS | 32. LINK COMPARTMENT |
| 12. FUEL VENT OUTLET | 33. AMMUNITION BOXES |
| 13. TWO-POSITION EXHAUST NOZZLE | 34. M-39 20 MM GUNS |
| 14. DRAG CHUTE CABLE STOWAGE RECESS | 35. FOLDING PITOT-STATIC BOOM |
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| 16. CONTROLLABLE HORIZONTAL STABILIZER | 37. ARRESTING HOOK |
| 17. SINGLE-POINT REFUELING RECEPTACLE | 38. EXTERNAL POWER RECEPTACLES (ELECTRICAL AND STARTER AIR SUPPLY) |
| 18. WING FLAP | 39. RECOGNITION LIGHT (ANTICOLLISION LIGHT*) |
| 19. AILERONS | 40. LANDING LIGHTS |
| 20. WING FENCE | 41. RECOGNITION LIGHT* |
| 21. POSITION LIGHT | |

Figure 1-2 (Sheet 2 of 2)

surfaces are actuated by irreversible hydraulic systems. Desired aerodynamic pilot feel is simulated by an artificial-feel system. A hydraulically actuated speed brake is on the lower surface of the fuselage and a drag chute is in the lower surface of the aft fuselage. 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. The F-100F-20 airplane is essentially the same as the other F-100F series airplanes in general flight and mission characteristics. The physical differences are the ducted flaps. In addition, internal tanks and 450- and 335-gallon drop tanks can be single-point refueled without the engine operating.

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
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 takeoff gross weight of the airplane (including full internal load and pilot) is as follows:

No external load (clean airplane) 31,000 pounds

F-100F:

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

F-100F-2 through F-100F-16 - no external load (clean airplane) 31,350 pounds

F-100F-20 - no external load (clean airplane) 31,800 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, or 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. Installation of the -23 afterburner improves afterburner performance and reliability. (See figure 1-5.)

The installed sea-level static thrust of the engine is about 8,300 pounds at Military Thrust and about 13,000 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.)

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. The engine fuel control system is shown schematically in figure 1-20.

Fuel Pump Unit.

The engine-driven fuel pump unit (figure 1-20) 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, the fuel regulating transfer valve in the pump unit opens and automatically sends the afterburner element output to the engine fuel control unit, and terminates afterburner operation. 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 1-20), 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.

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
56-3331 thru -3378

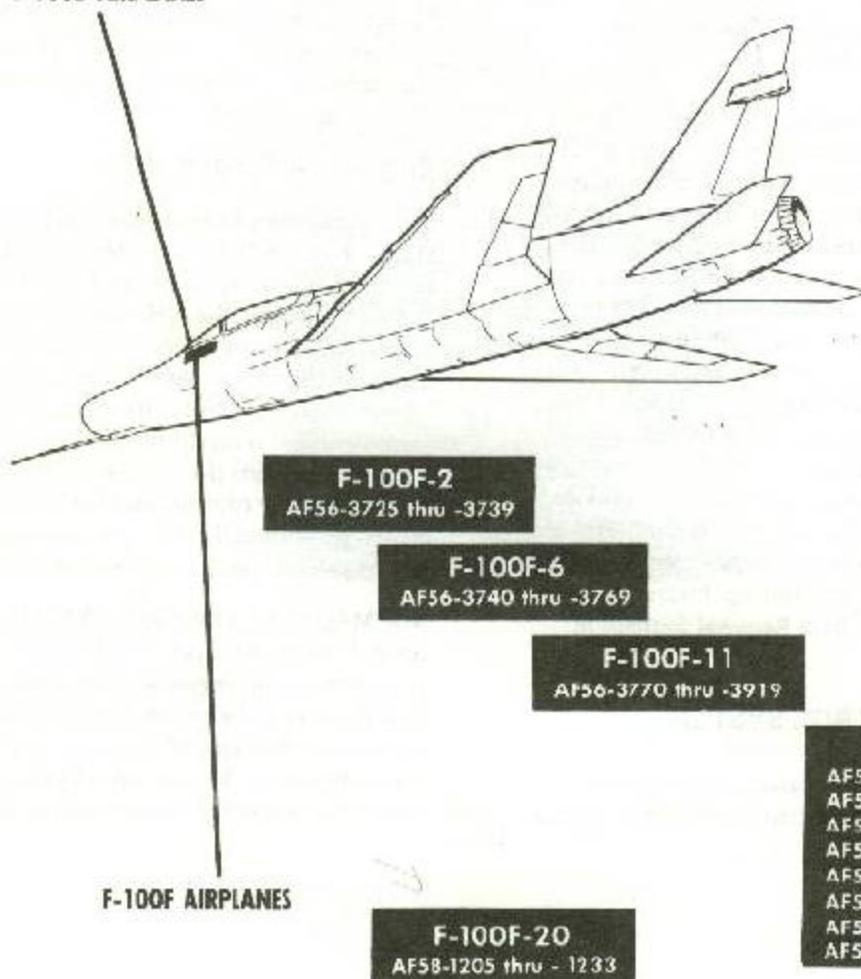
F-100D-86-NH
56-3379 thru -3463

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

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-100D AIRPLANES

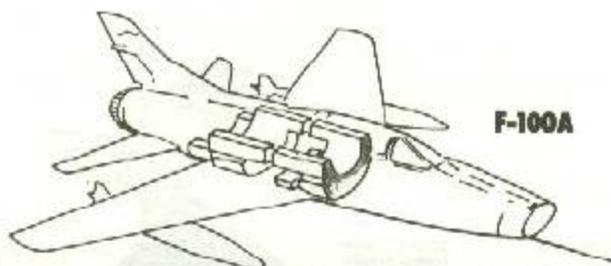


1100J-A1040

Figure 1-3

MAIN DIFFERENCES TABLE

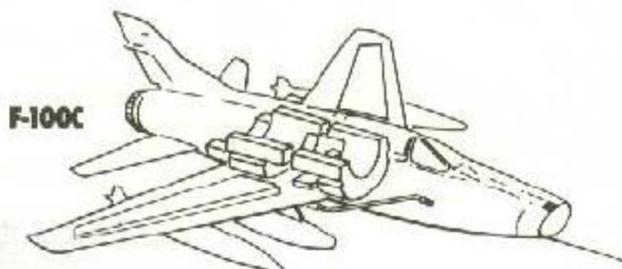
F-100 SERIES



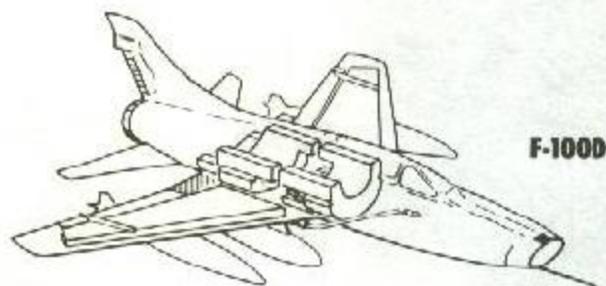
F-100A

ENGINE	J57-21 OR -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

ENGINE	J57-21 OR -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



F-100C



F-100D

ENGINE	J57-21 OR -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 - 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

ENGINE	J57-21 OR -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 - 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

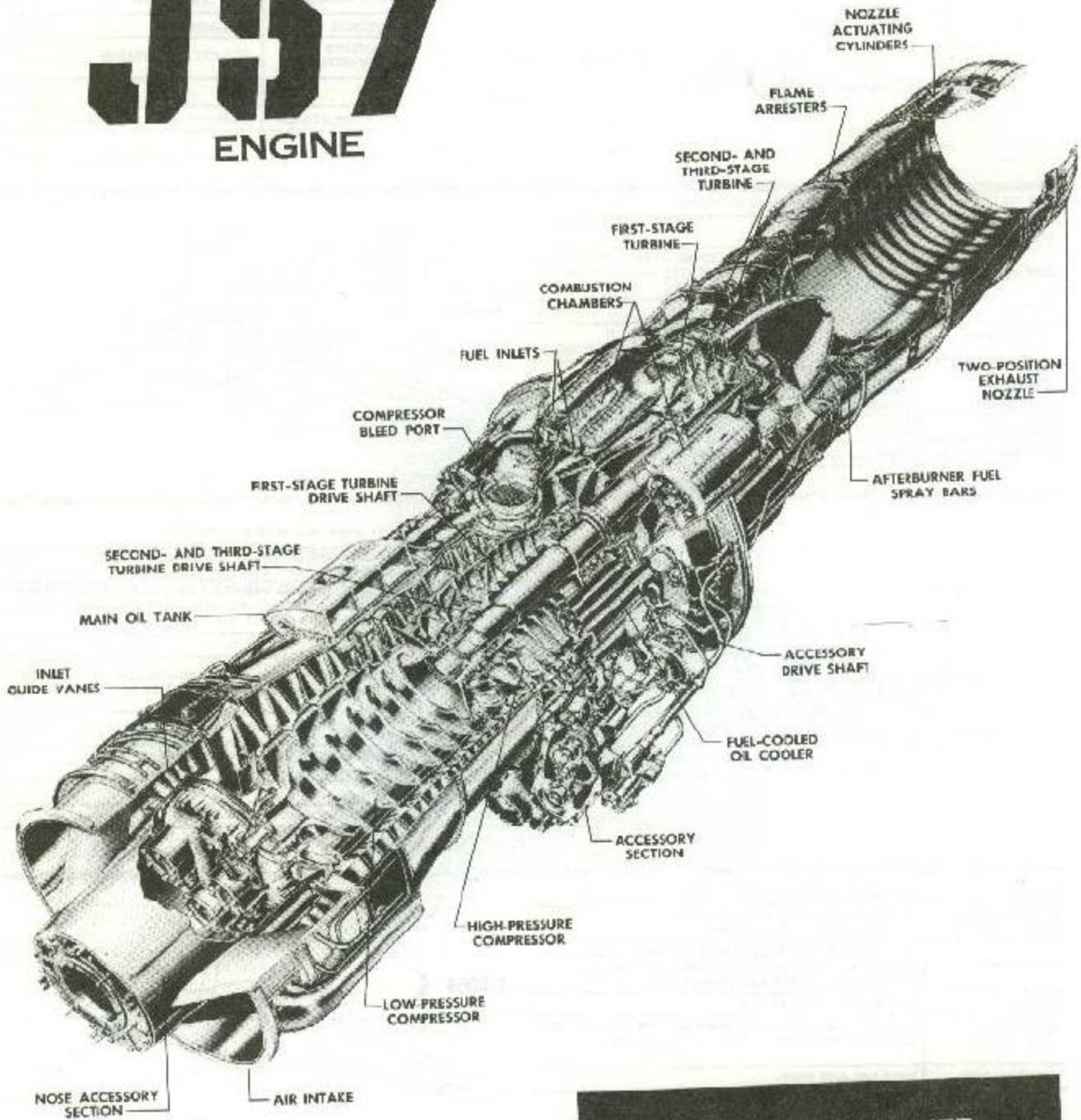


F-100F

Figure 1-4

J57

ENGINE



WITH AFTERBURNER

Figure 1-5

INSTRUMENT PANEL F-100D AND FRONT COCKPIT F-100F

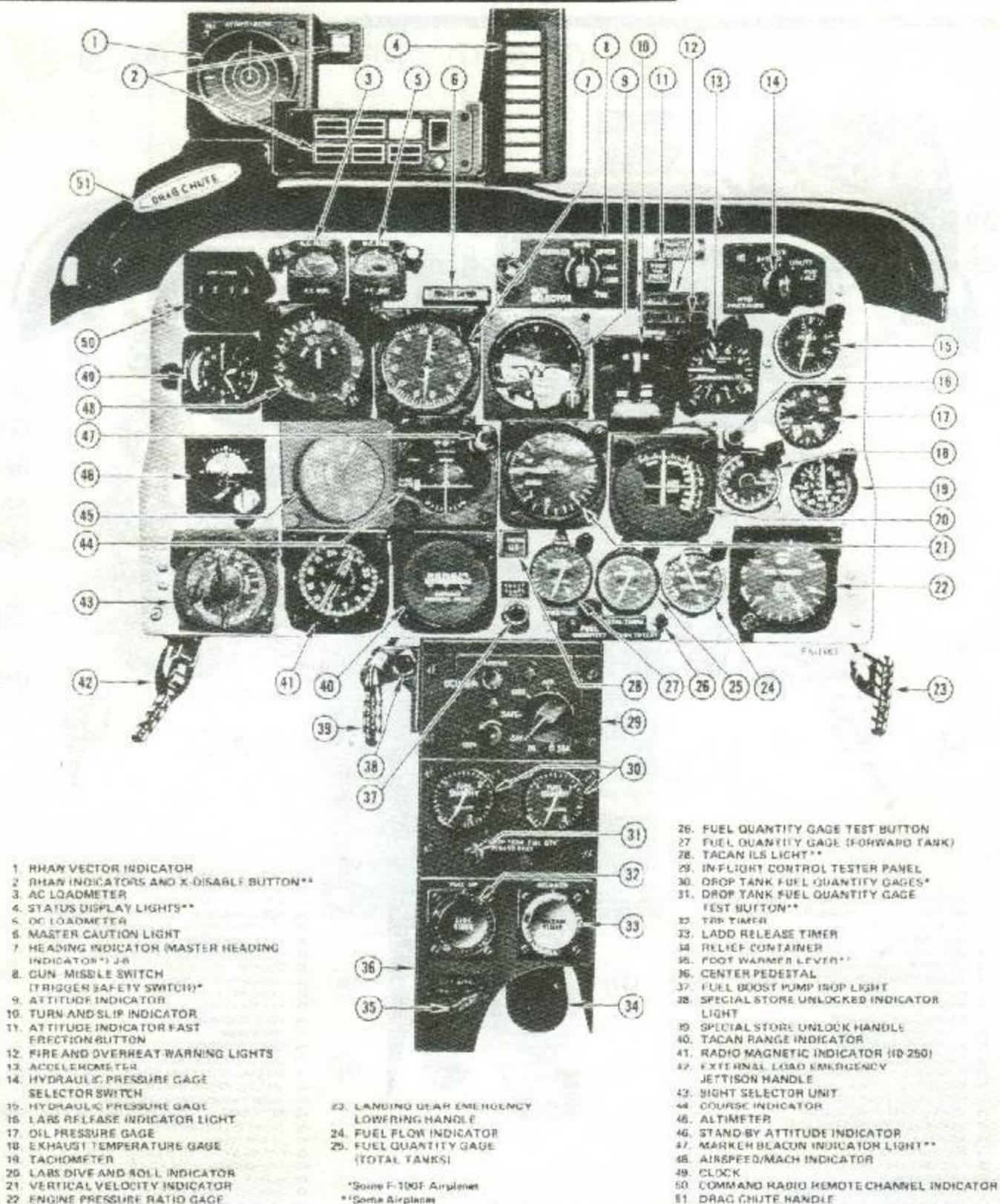
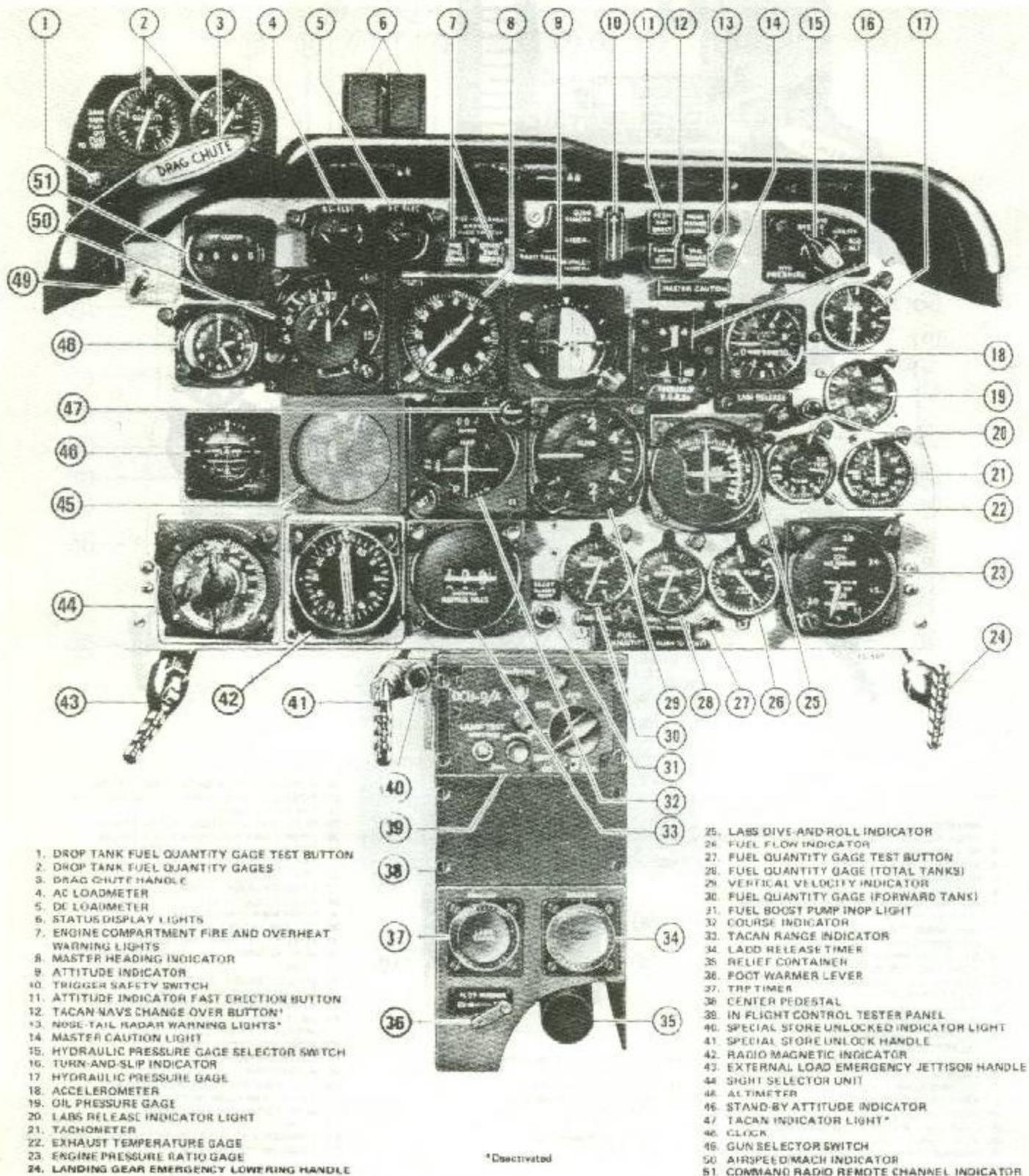


Figure 1-6

INSTRUMENT PANEL-F-100D SOME AIRPLANES

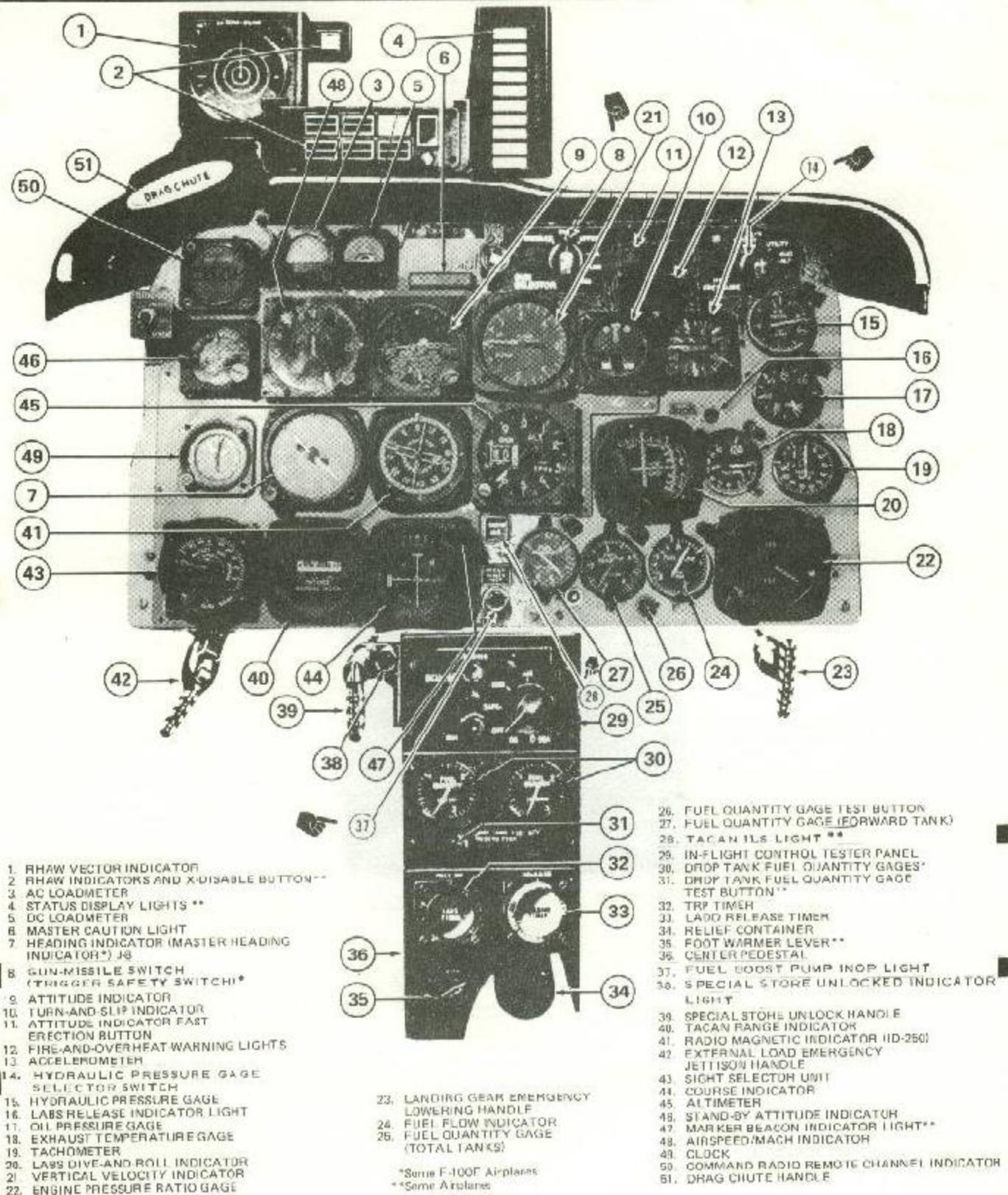


1. DROP TANK FUEL QUANTITY GAGE TEST BUTTON
2. DROP TANK FUEL QUANTITY GAGES
3. DRAG CHUTE HANDLE
4. AC LOADMETER
5. DC LOADMETER
6. STATUS DISPLAY LIGHTS
7. ENGINE COMPARTMENT FIRE AND OVERHEAT WARNING LIGHTS
8. MASTER HEADING INDICATOR
9. ATTITUDE INDICATOR
10. TRIGGER SAFETY SWITCH
11. ATTITUDE INDICATOR 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

*Deactivated

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. FUEL BOOST PUMP INOP LIGHT
32. COURSE INDICATOR
33. TACAN RANGE INDICATOR
34. LADD RELEASE TIMER
35. RELIEF CONTAINER
36. FOOT WARMER LEVER
37. TRP TIMER
38. CENTER PEDESTAL
39. IN FLIGHT CONTROL TESTER PANEL
40. SPECIAL STORE UNLOCKED INDICATOR LIGHT
41. SPECIAL STORE UNLOCK HANDLE
42. RADIO MAGNETIC INDICATOR
43. EXTERNAL LOAD EMERGENCY JETTISON HANDLE
44. SIGHT SELECTOR UNIT
45. ALTIMETER
46. STANDBY ATTITUDE INDICATOR
47. TACAN INDICATOR LIGHT*
48. CLOCK
49. GUN SELECTOR SWITCH
50. AIRSPEED/RACH INDICATOR
51. COMMAND RADIO REMOTE CHANNEL INDICATOR

Figure 1-7

INSTRUMENT PANEL F-100D AND FRONT COCKPIT F-100F (T.C.T.O. 1F-100-1132)

1. RHAW VECTOR INDICATOR
2. RHAW INDICATORS AND X-DISABLE BUTTON**
3. AC LOADMETER
4. STATUS DISPLAY LIGHTS **
5. DC LOADMETER
6. MASTER CAUTION LIGHT
7. HEADING INDICATOR (MASTER HEADING INDICATOR*) J8
8. GUN-MISSILE SWITCH (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

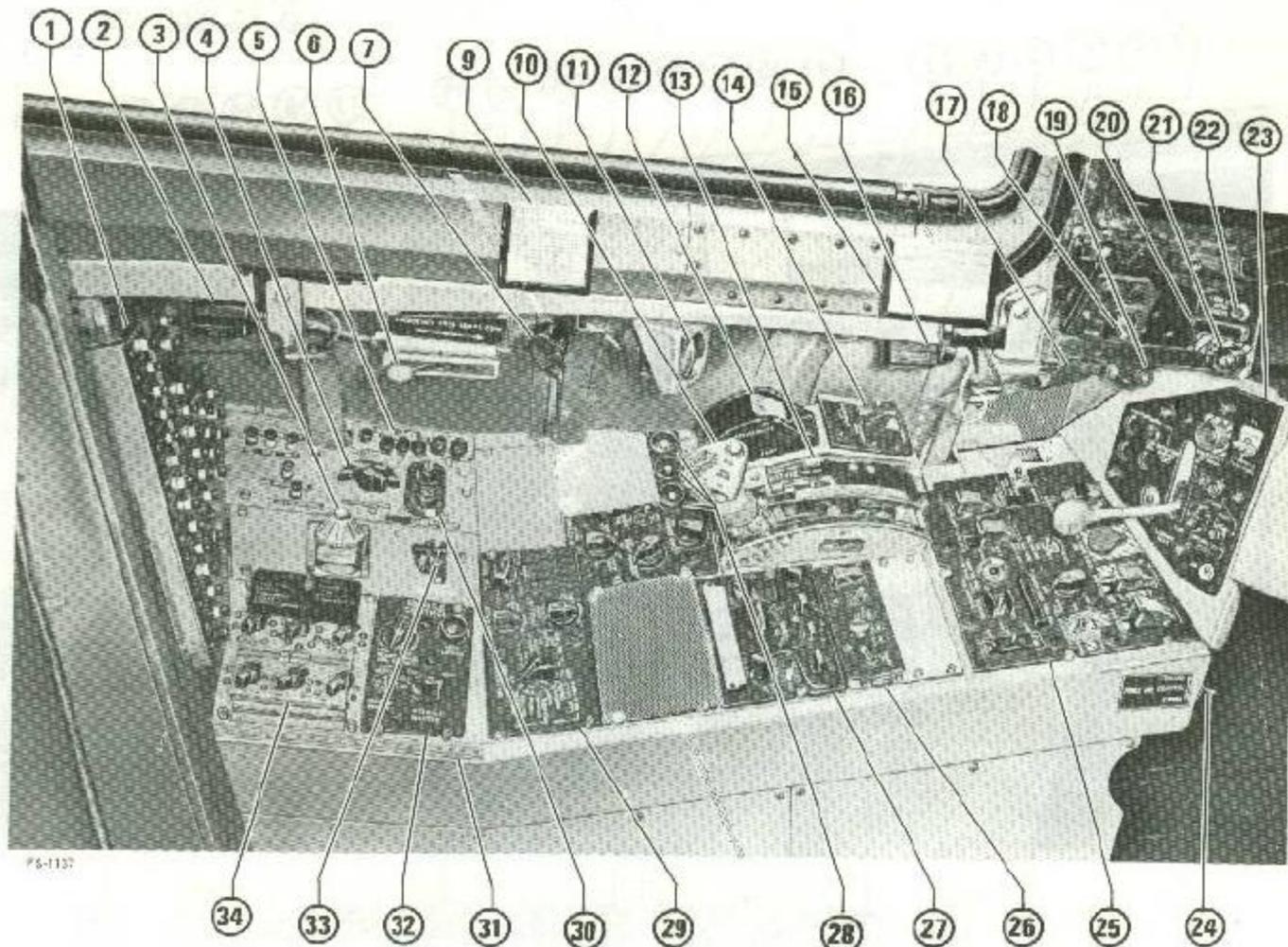
23. LANDING GEAR EMERGENCY LOWERING HANDLE
24. FUEL FLOW INDICATOR
25. FUEL QUANTITY GAGE (TOTAL TANKS)

*Some F-100F Airplanes
**Some Airplanes

26. FUEL QUANTITY GAGE TEST BUTTON
27. FUEL QUANTITY GAGE (FORWARD TANK)
28. TACAN ILS LIGHT **
29. IN-FLIGHT CONTROL TESTER PANEL
30. DROP TANK FUEL QUANTITY GAGES*
31. DROP TANK FUEL QUANTITY GAGE TEST BUTTON**
32. TRP TIMER
33. LABS RELEASE TIMER
34. RELIEF CONTAINER
35. FOOT WARMER LEVER**
36. CENTER PEDESTAL
37. FUEL BOOST PUMP INOP LIGHT
38. SPECIAL STORE UNLOCKED INDICATOR LIGHT
39. SPECIAL STORE UNLOCK HANDLE
40. TACAN RANGE INDICATOR
41. RADIO MAGNETIC INDICATOR (RD-250)
42. EXTERNAL LOAD EMERGENCY JETTISON HANDLE
43. SIGHT SELECTOR UNIT
44. COURSE INDICATOR
45. ALTITUDE
46. STAND-BY ATTITUDE INDICATOR
47. MARKER BEACON INDICATOR LIGHT**
48. AIRSPEED/MACH INDICATOR
49. CLOCK
50. COMMAND RADIO REMOTE CHANNEL INDICATOR
51. DRAG CHUTE HANDLE

Figure 1-7A

COCKPIT—F-100D LEFT SIDE



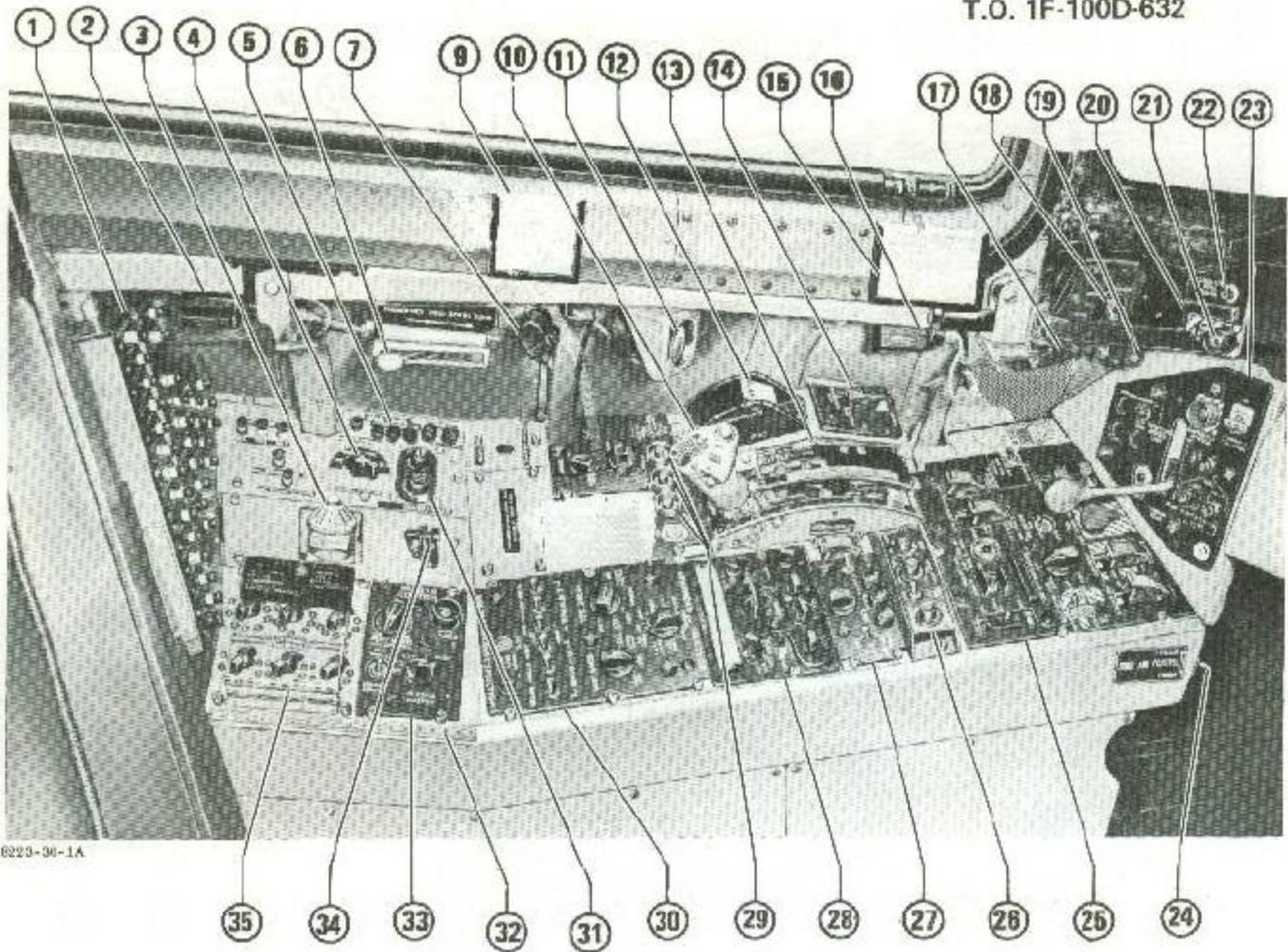
- | | |
|--|---|
| 1. CIRCUIT-BREAKER PANEL | 18. CANOPY SWITCH |
| 2. CONSOLE FLOODLIGHT | 19. CONSOLE FLOODLIGHT |
| 3. ANTI-G SUIT PRESSURE REGULATING VALVE | 20. CANOPY-NOT-LOCKED CAUTION LIGHT |
| 4. CAMERA SHUTTER SELECTOR SWITCH | 21. ARRESTING HOOK RELEASE BUTTON |
| 5. SPARE LAMPS | 22. LABS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

*Some airplanes

Figure 1-8

F-100D COCKPIT LEFT SIDE

TER AIRPLANES
MODIFIED BY
T.O. 1F-100D-632



6223-36-1A

- | | |
|--|--|
| <ol style="list-style-type: none"> 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. DELETED 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. INSTRUMENT PANEL FLOODLIGHT 18. CANOPY SWITCH | <ol style="list-style-type: none"> 19. CONSOLE FLOODLIGHT 20. CANOPY NOT-LOCKED CAUTION LIGHT 21. ARRESTING HOOK RELEASE BUTTON 22. LABS YAW-ROLL GYRO CHECK BUTTON 23. LANDING GEAR CONTROL PANEL 24. FOOT AIR CONTROL LEVER 25. ENGINE AND FLIGHT CONTROL PANEL 26. AWRS CONTROL PANEL 27. SEFK SILENCE CONTROL PANEL 28. COMMAND RADIO CONTROL PANEL 29. EXTERNAL LOAD AUXILIARY RELEASE BUTTONS 30. ARMAMENT CONTROL PANEL 31. GUN CAMERA TIMER 32. CONSOLE AIR OUTLETS 33. AIM-9B/E/J MISSILE CONTROL PANEL 34. GROUND FIRE SWITCH 35. PYLON LOADING CONTROL PANEL |
|--|--|

*Some airplanes

Figure 1-9

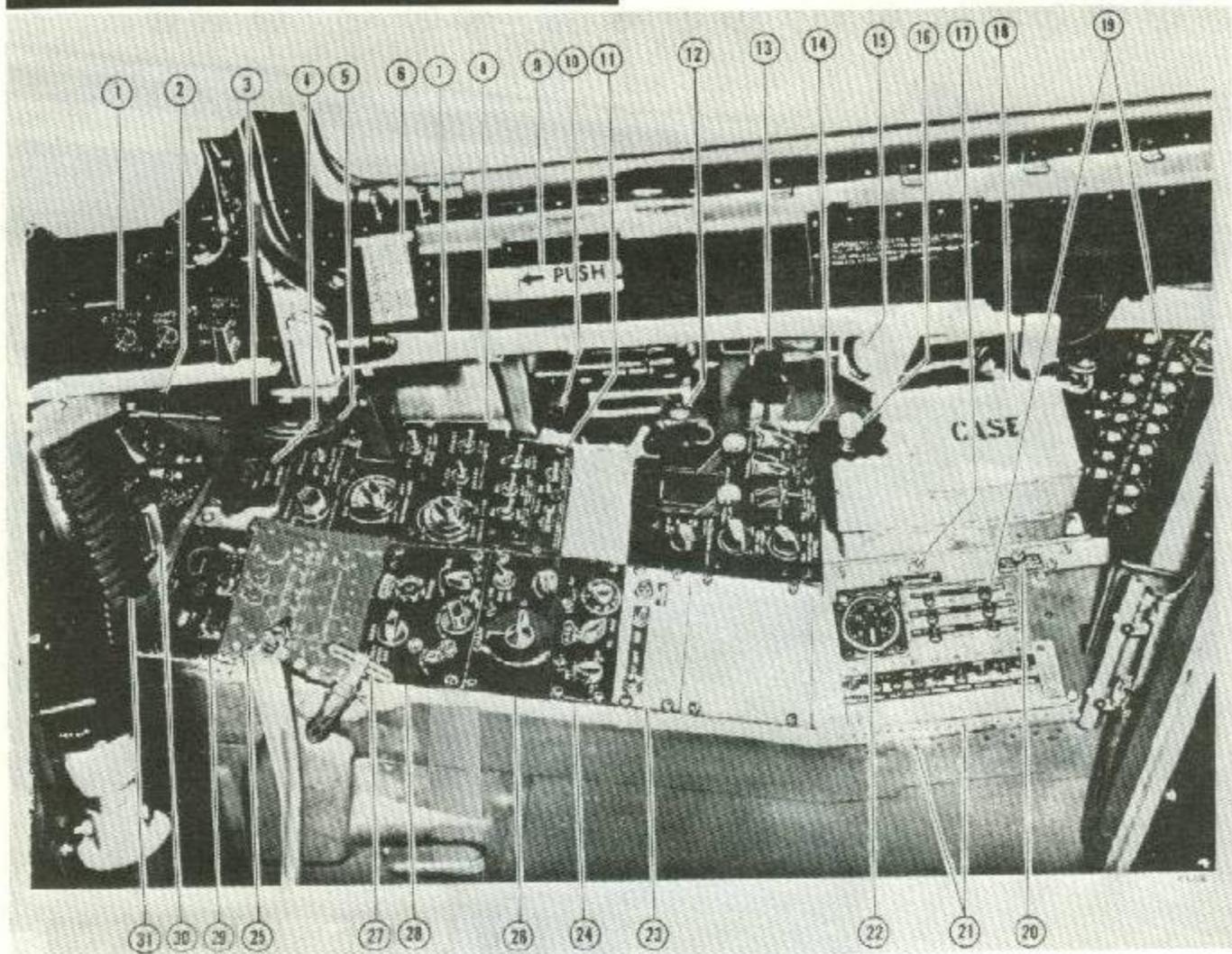
COCKPIT—F-100D RIGHT SIDE



- | | |
|--|--|
| 1. STANDBY INSTRUMENT INVERTER SWITCH | 16. INTERPHONE SWITCH |
| 2. CONSOLE FLOODLIGHT | 17. DC FUEL BOOST PUMP TEST SWITCH* |
| 3. INSTRUMENT PANEL FLOODLIGHT | 18. CIRCUIT BREAKER PANELS |
| 4. LIQUID OXYGEN QUANTITY GAGE | 19. CONSOLE AIR OUTLETS |
| 5. NAVIGATION COMPUTER | 20. COCKPIT PRESSURE ALTITUDE INDICATOR |
| 6. MAGNETIC COMPASS CORRECTION CARD | 21. RADAR BEACON CONTROL PANEL* |
| 7. CONSOLE FLOODLIGHT | 22. EXTERIOR FLOODLIGHT - ANTICOLLISION LIGHT PANEL* |
| 8. LIGHTING CONTROL PANEL | 23. J4 COMPASS CONTROL PANEL |
| 9. CANOPY INTERNAL MANUAL EMERGENCY RELEASE HANDLE | 24. IFF/SIF CONTROL PANEL |
| 10. COCKPIT UTILITY LIGHT | 25. TACAN CONTROL PANEL |
| 11. FLIGHT CONTROL EMERGENCY HYDRAULIC PUMP LEVER | 26. CANOPY ALTERNATE EMERGENCY JETTISON HANDLE |
| 12. AIR CONDITIONING CONTROL PANEL | 27. RADIO COMPASS CONTROL PANEL |
| 13. GUN SIGHT GROUND TEST PLUG | 28. OXYGEN REGULATOR CONTROL PANEL |
| 14. THUNDERSTORM LIGHT | 29. ELECTRICAL CONTROL PANEL |
| 15. MAP CASE | 30. INDICATOR AND CAUTION LIGHT PANEL |

*Some airplanes

Figure 1-10

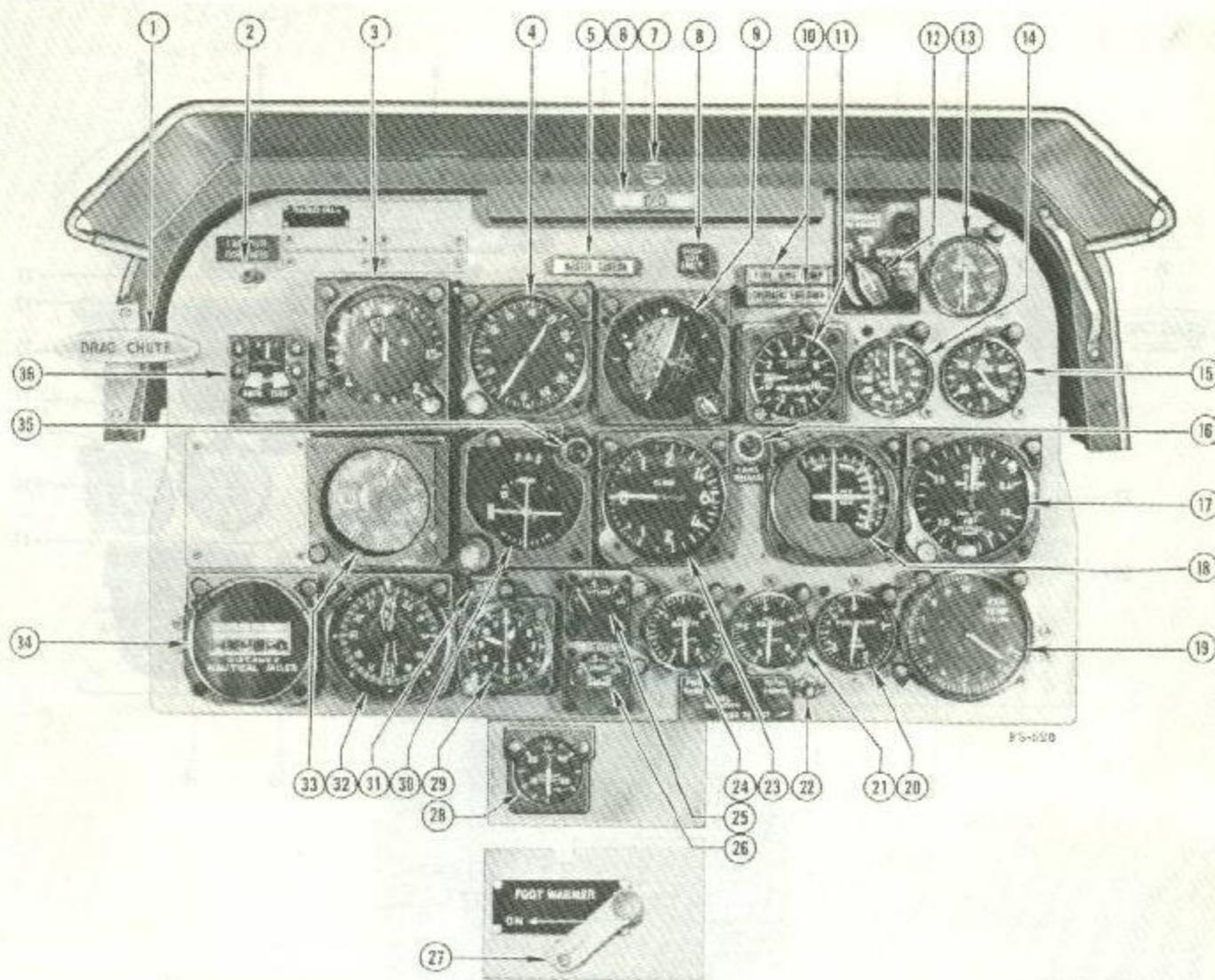
COCKPIT — F-100D**SOME AIRPLANES
RIGHT SIDE**

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

*Some airplanes

Figure 1-11

INSTRUMENT PANEL — F-100F REAR COCKPIT



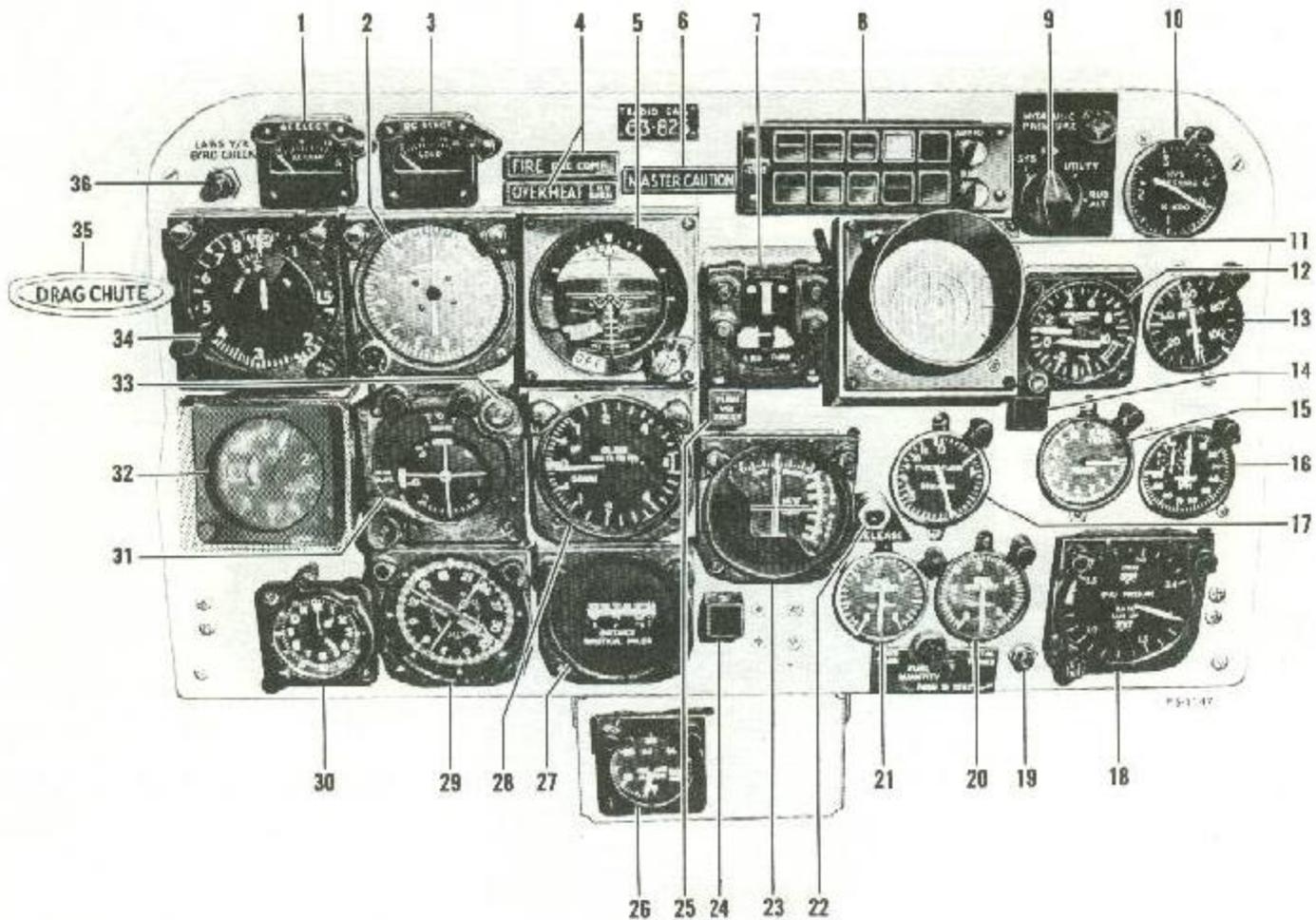
- | | |
|--|---|
| 1. DRAG CHUTE HANDLE | 18. LABS DIVE-AND-ROLL INDICATOR |
| 2. LABS YAW-ROLL GYRO CHECK BUTTON | 19. EXHAUST TEMPERATURE GAGE |
| 3. AIRSPEED/MACH INDICATOR | 20. FUEL FLOW INDICATOR |
| 4. HEADING INDICATOR (MASTER HEADING INDICATOR*) | 21. FUEL QUANTITY GAGE (TOTAL TANKS) |
| 5.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

*Some airplanes

Figure 1-12

100F-1A60-9C

INSTRUMENT PANEL—F-100F RHAW AIRPLANES REAR COCKPIT



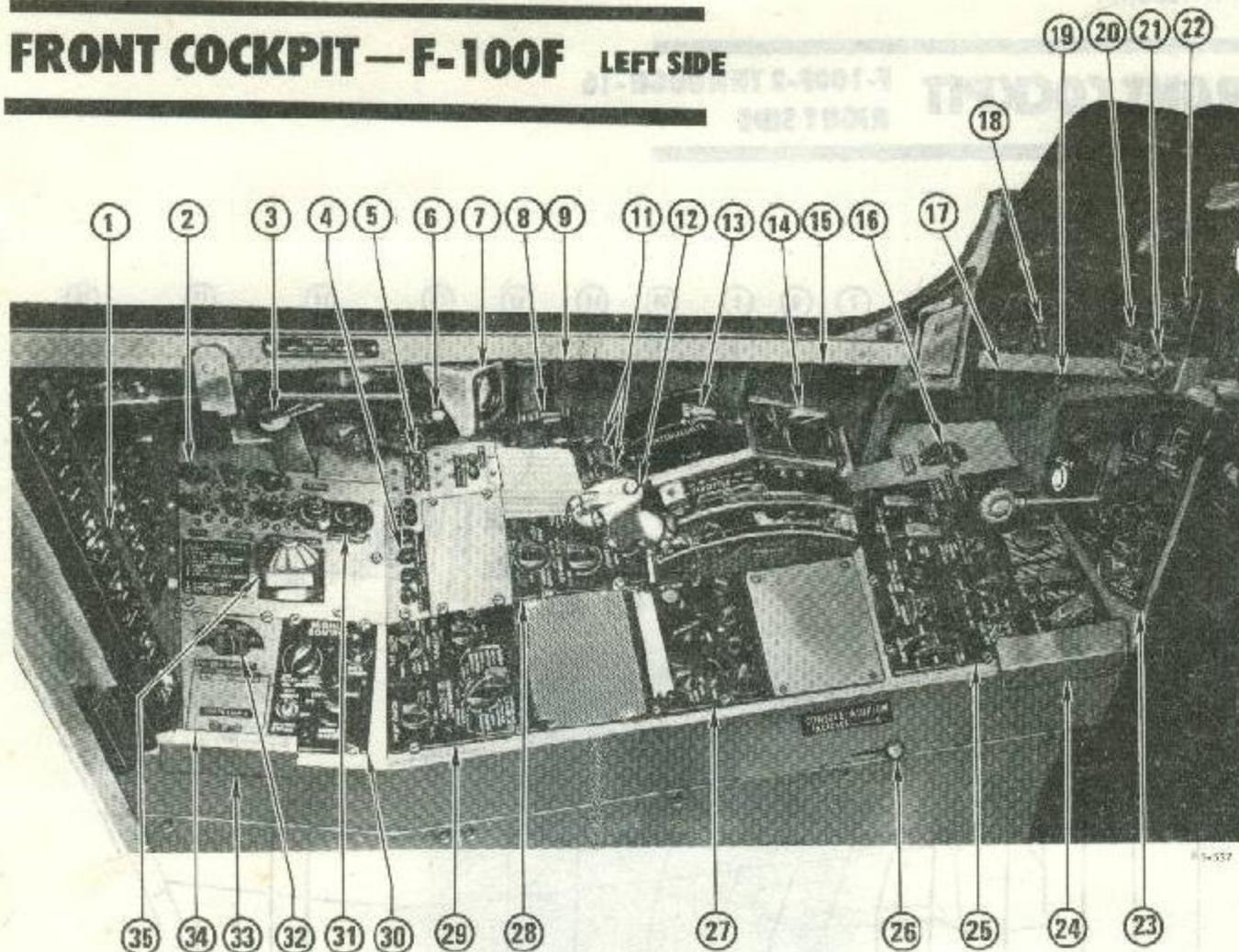
1. AC LOADMETER
2. HEADING INDICATOR
3. DC LOADMETER
4. FIRE-AND-OVERHEAT WARNING LIGHTS
5. ATTITUDE INDICATOR
6. MASTER CAUTION LIGHT
7. TURN-AND-SLIP INDICATOR
8. RHAW INDICATORS
9. HYDRAULIC PRESSURE GAGE SELECTOR SWITCH
10. HYDRAULIC PRESSURE GAGE
11. RHAW VECTOR INDICATOR
12. ACCELEROMETER
13. OIL PRESSURE GAGE
14. RHAW X-DISABLE BUTTON
15. EXHAUST TEMPERATURE GAGE
16. TACHOMETER
17. FUEL FLOW INDICATOR
18. ENGINE PRESSURE RATIO GAGE

19. FUEL QUANTITY GAGE TEST BUTTON
20. FUEL QUANTITY GAGE (TOTAL TANKS)
21. FUEL QUANTITY GAGE (FORWARD TANK)
22. LABS RELEASE INDICATOR LIGHT
23. LABS DIVE-AND-ROLL INDICATOR
24. TACAN ILS LIGHT
25. ATTITUDE INDICATOR FAST ERECTION BUTTON
26. COCKPIT PRESSURE ALTITUDE INDICATOR
27. TACAN RANGE INDICATOR
28. VERTICAL VELOCITY INDICATOR
29. RADIO MAGNETIC INDICATOR
30. CLOCK
31. COURSE INDICATOR
32. ALTIMETER
33. MARKER BEACON INDICATOR LIGHT
34. AIRSPEED/MACH INDICATOR
35. DRAG CHUTE HANDLE
36. LABS YAW-ROLL GYRO CHECK BUTTON

100F-1-A60-20

Figure 1-13

FRONT COCKPIT — F-100F LEFT SIDE

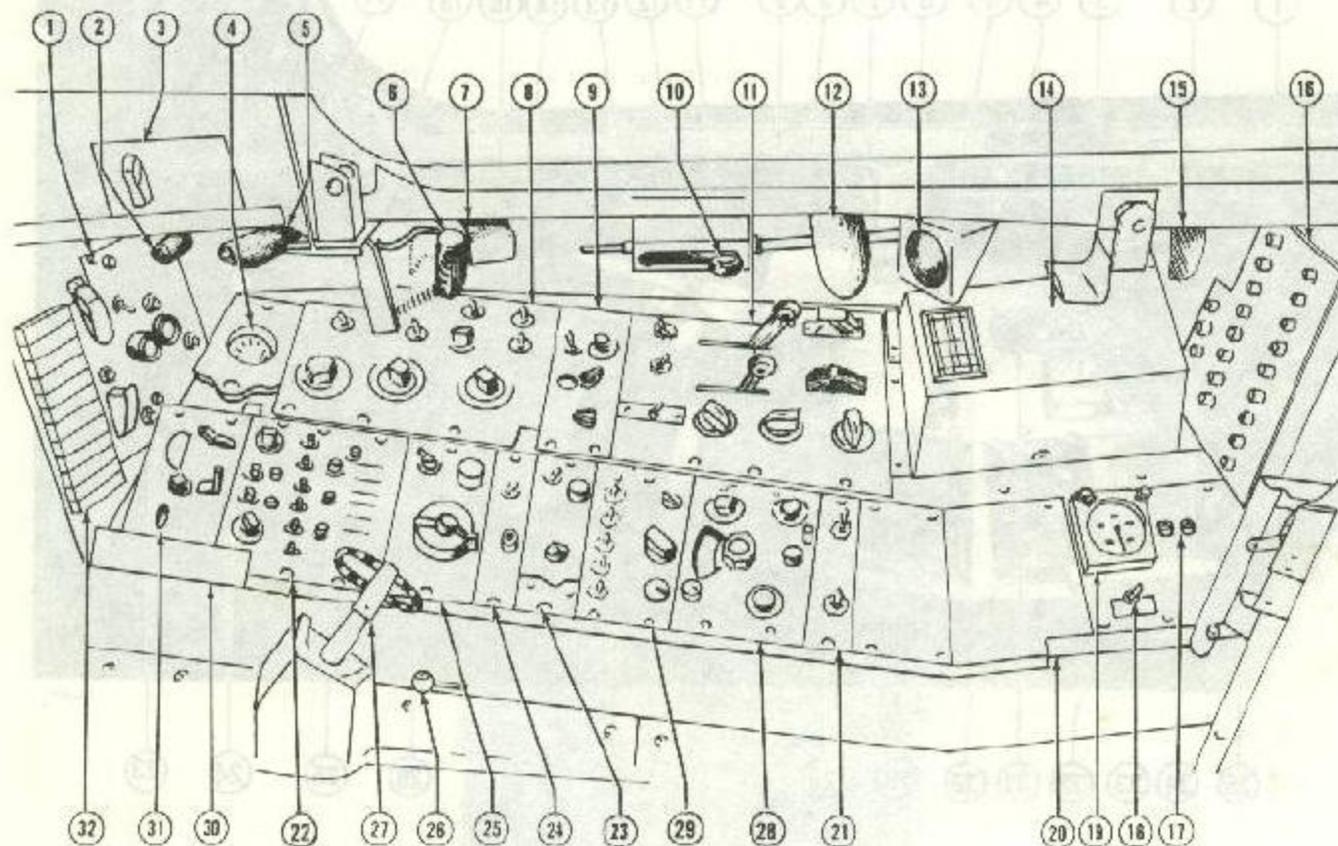


- | | |
|---|---|
| 1. CIRCUIT-BREAKER PANEL | 19. CONSOLE FLOODLIGHT |
| 2. PYLON LOADING SELECTOR SWITCHES | 20. CANOPY-NOT-LOCKED WARNING LIGHT |
| 3. SPEED BRAKE EMERGENCY DUMP LEVER | 21. ARRESTING HOOK RELEASE BUTTON |
| 4. SPARE LAMP PANEL | 22. LABS YAW-ROLL GYRO CHECK BUTTON |
| 5. SPECIAL STORE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

*Some airplanes

Figure 1-14

FRONT COCKPIT F-100F-2 THROUGH-16 RIGHT SIDE

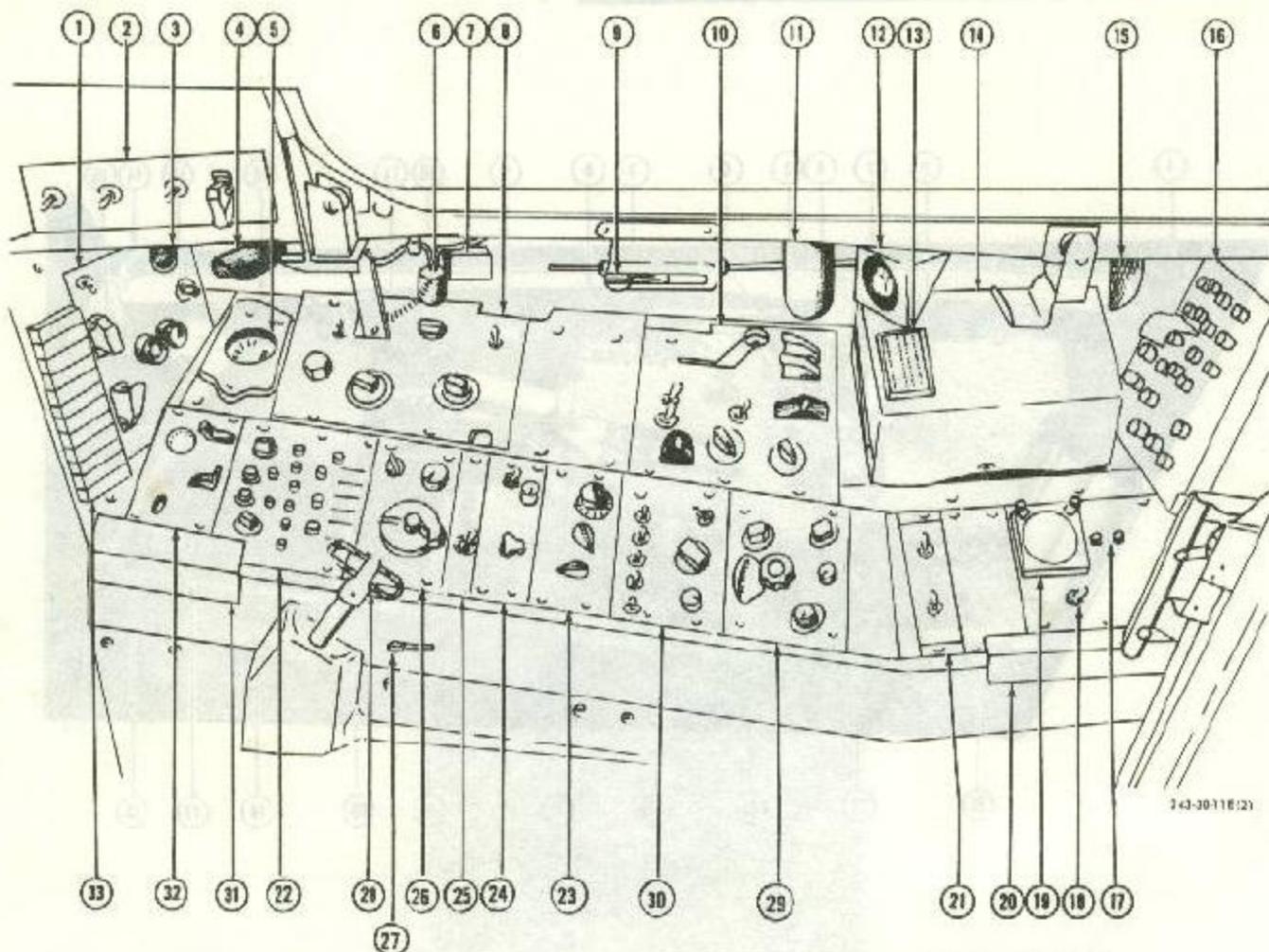


- | | |
|---|---|
| <ul style="list-style-type: none"> 1. ELECTRICAL CONTROL PANEL 2. ELECTRICAL CONTROL PANEL FLOODLIGHT 3. STAND-BY INSTRUMENT INVERTER SWITCH 4. LIQUID OXYGEN QUANTITY GAGE 5. INSTRUMENT PANEL FLOODLIGHT 6. COCKPIT UTILITY LIGHT 7. CONSOLE FLOODLIGHT 8. LIGHTING CONTROL PANEL 9. J-4 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 | <ul style="list-style-type: none"> 17. CIRCUIT-BREAKER PANEL 18. FUEL BOOST PUMP TEST SWITCH* 19. COCKPIT PRESSURE ALTITUDE INDICATOR 20. CONSOLE AIR DEFLECTOR 21. EXTERIOR FLOODLIGHT PANEL* 22. IFF/SIF CONTROL PANEL 23. ILS CONTROL PANEL 24. RADIO CONTROL TRANSFER PANEL 25. TACAN CONTROL PANEL 26. CONSOLE AIRFLOW KNOB* 27. CANOPY ALTERNATE EMERGENCY JETTISON HANDLE 28. RADIO COMPASS CONTROL PANEL 29. COMMUNICATION AMPLIFIER CONTROL PANEL 30. CONSOLE AIR DEFLECTOR 31. OXYGEN REGULATOR CONTROL PANEL 32. INDICATOR AND CAUTION LIGHT PANEL |
|---|---|

*Some airplanes

Figure 1-15

FRONT COCKPIT — F-100F-20 RIGHT SIDE



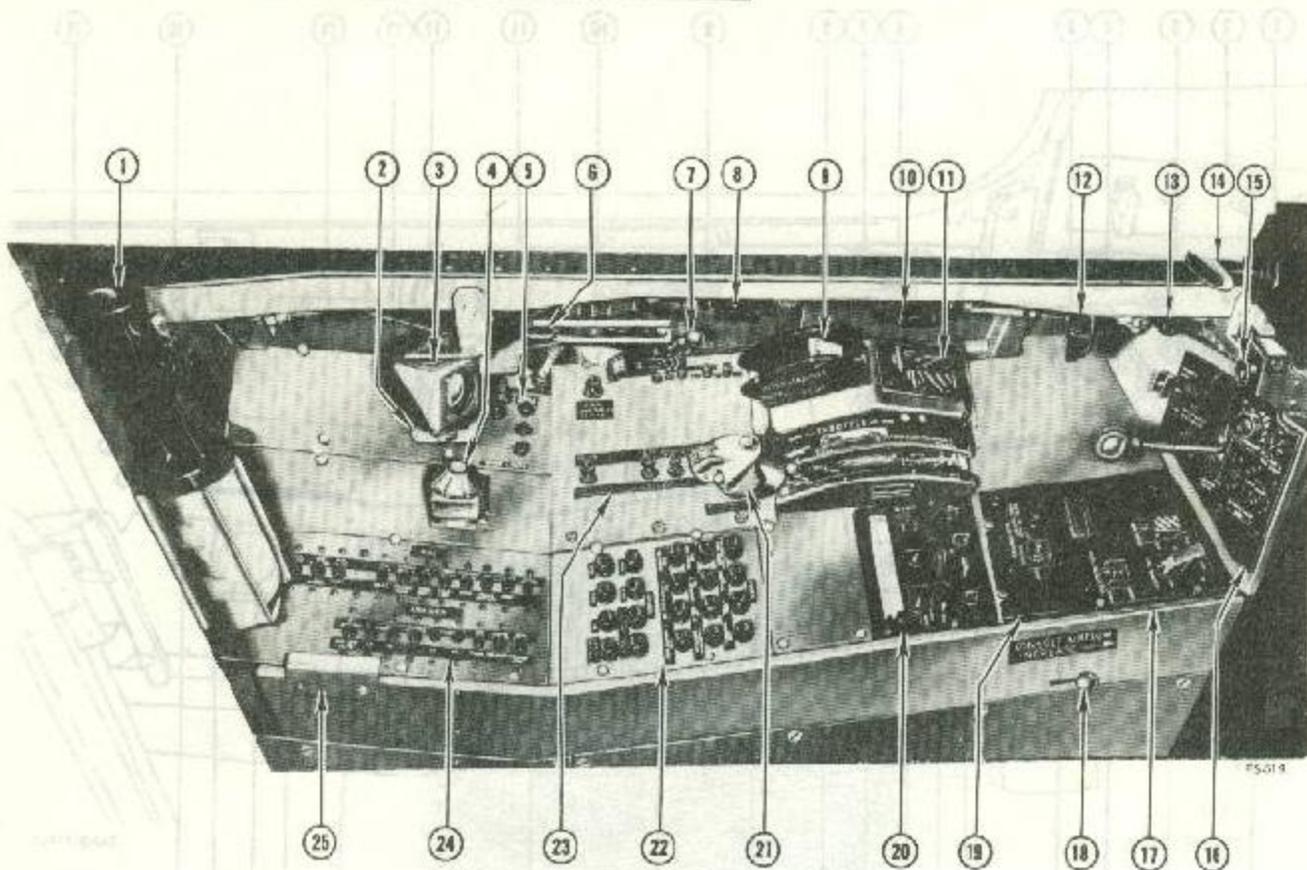
243-30116(2)

- | | |
|--|--|
| 1. ELECTRICAL CONTROL PANEL | 18. DC FUEL BOOST PUMP TEST SWITCH* |
| 2. STAND-BY INSTRUMENT INVERTER PANEL | 19. COCKPIT PRESSURE ALTITUDE INDICATOR |
| 3. ELECTRICAL CONTROL PANEL FLOODLIGHT | 20. CONSOLE AIR DEFLECTOR |
| 4. INSTRUMENT PANEL FLOODLIGHT | 21. EXTERIOR FLOODLIGHT - ANTICOLLISION LIGHT PANEL* |
| 5. LIQUID OXYGEN QUANTITY GAGE | 22. IFF/SIF CONTROL PANEL |
| 6. COCKPIT UTILITY LIGHT | 23. J-4 COMPASS CONTROL PANEL |
| 7. CONSOLE FLOODLIGHT | 24. ILS CONTROL PANEL |
| 8. LIGHTING CONTROL PANEL | 25. TACAN-ILS CHANGE-OVER PANEL |
| 9. FLIGHT CONTROL EMERGENCY HYDRAULIC PUMP LEVER | 26. TACAN CONTROL PANEL |
| 10. AIR CONDITIONING CONTROL PANEL | 27. CONSOLE AIRFLOW KNOB |
| 11. CONSOLE FLOODLIGHT | 28. CANOPY ALTERNATE EMERGENCY JETTISON HANDLE |
| 12. THUNDERSTORM LIGHT | 29. RADIO COMPASS CONTROL PANEL |
| 13. ENGINE PRESSURE RATIO CARD | 30. COMMUNICATION AMPLIFIER CONTROL PANEL |
| 14. MAP CASE | 31. CONSOLE AIR DEFLECTOR |
| 15. CONSOLE FLOODLIGHT | 32. OXYGEN REGULATOR CONTROL PANEL |
| 16. CIRCUIT-BREAKER PANEL | 33. INDICATOR AND CAUTION LIGHT PANEL |
| 17. CIRCUIT-BREAKER PANEL | |

*Some airplanes

Figure 1-16

REAR COCKPIT—F-100F LEFT SIDE



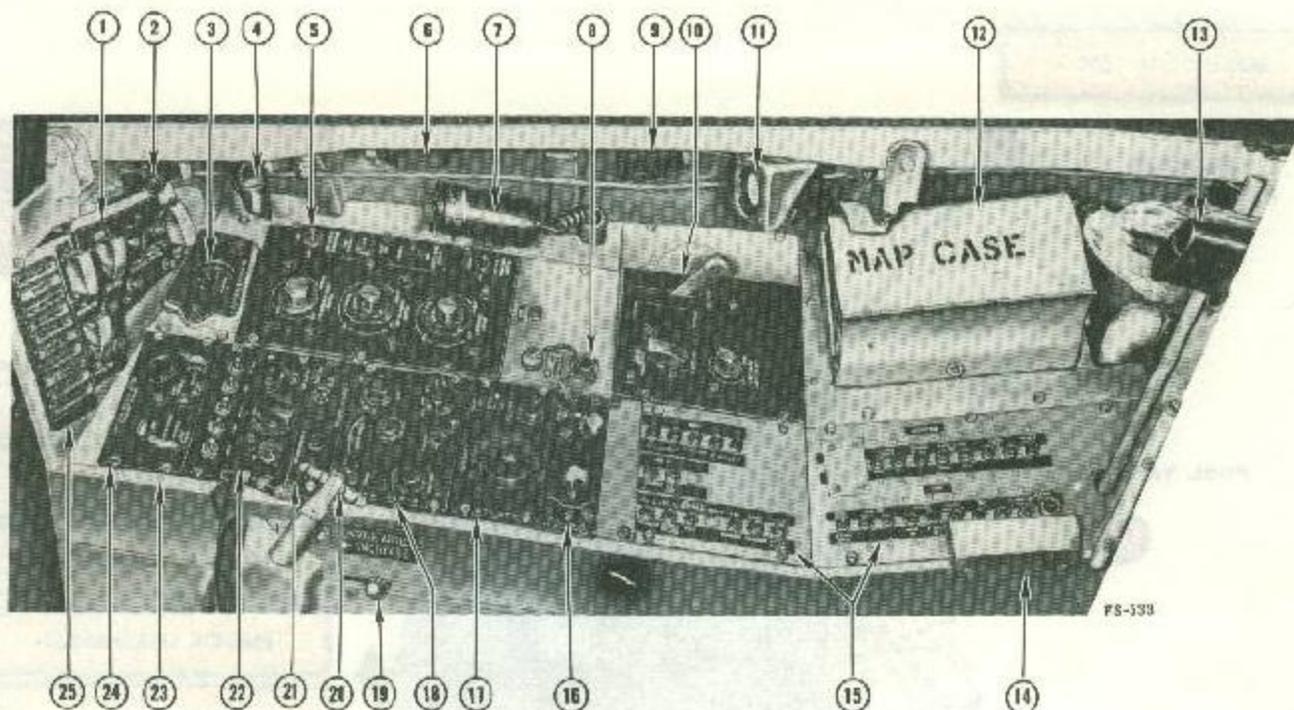
- 1. RELIEF CONTAINER
- 2. SPARE LAMP CONTAINER
- 3. THUNDERSTORM LIGHT
- 4. ANTI-G SUIT PRESSURE-REGULATING VALVE
- 5. SPARE LAMP PANEL
- 6. SPEED BREAK EMERGENCY DUMP LEVER
- 7. EMERGENCY RAM-AIR LEVER
- 8. CONSOLE FLOODLIGHT
- 9. WING FLAP HANDLE
- 10. CONSOLE FLOODLIGHT
- 11. WING FLAP EMERGENCY 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. CIRCUIT-BREAKER PANEL
- 25. CONSOLE AIR DEFLECTOR

* Some airplanes

Figure 1-17

REAR COCKPIT—F-100F RIGHT SIDE



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

* Some airplanes.

Figure I-18

F-100D/F FRONT COCKPIT INDICATOR, CAUTION, AND

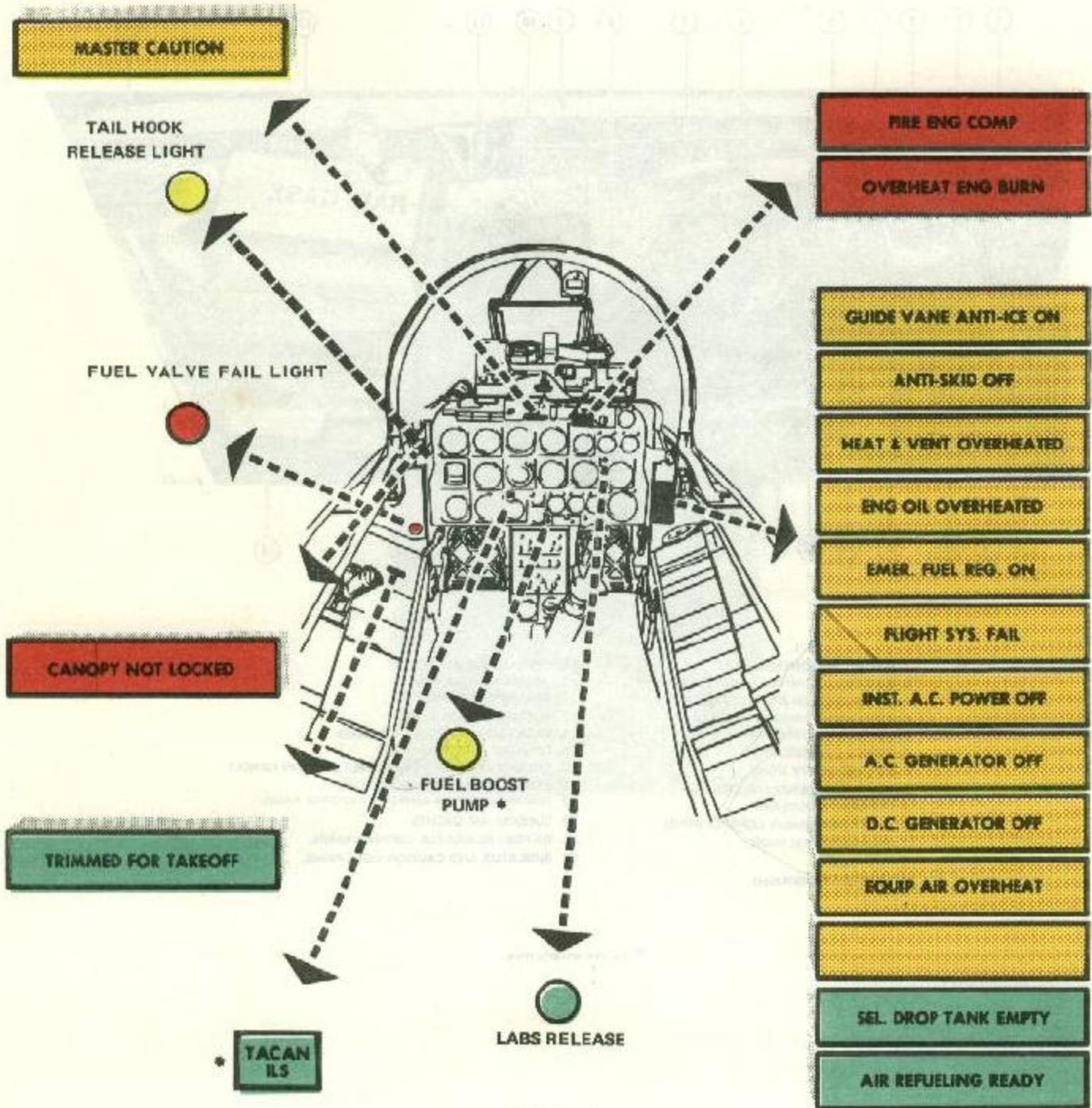


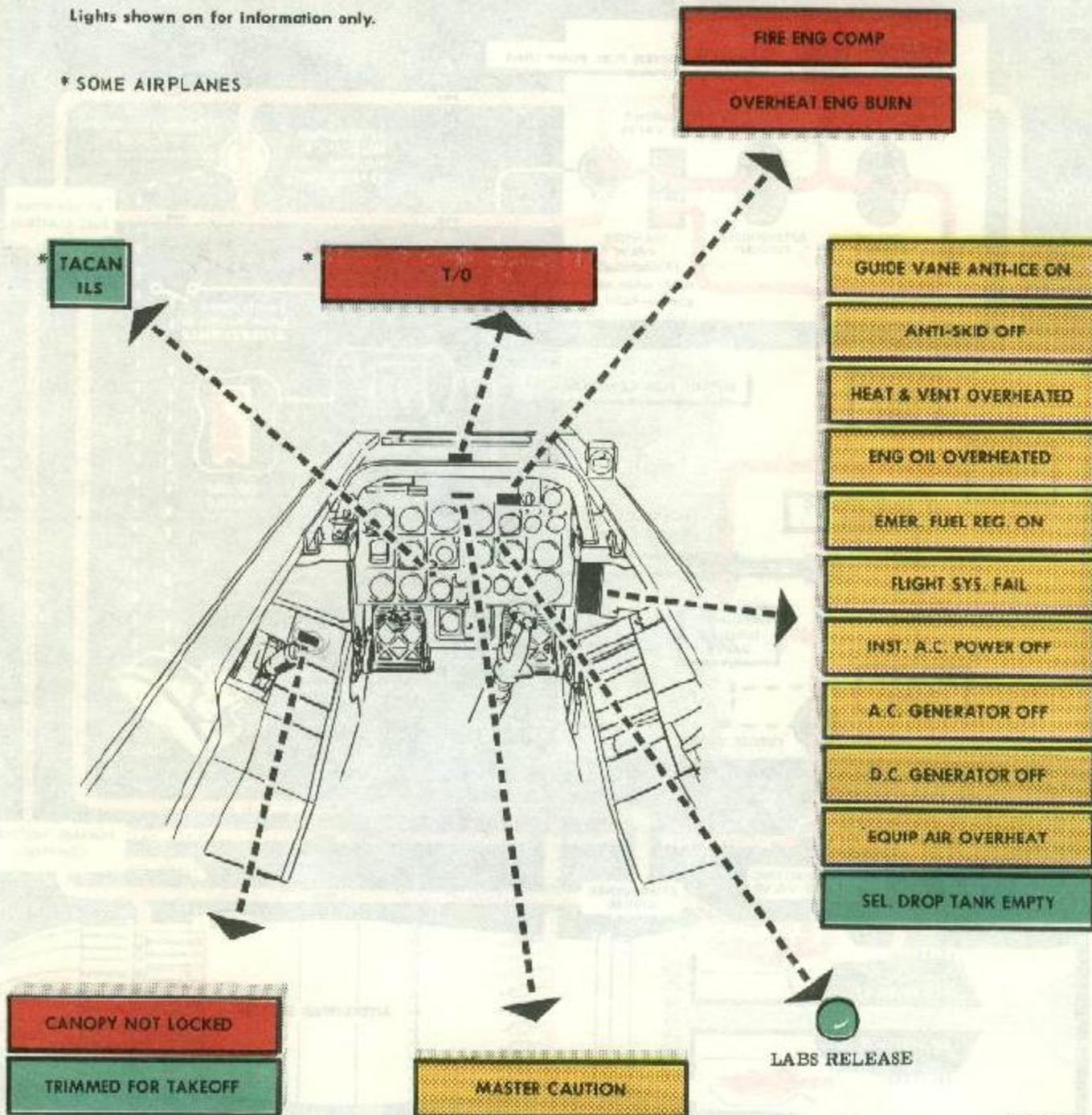
Figure 1-19 (Sheet 1 of 2)

WARNING LIGHTS F-100F REAR COCKPIT

NOTE

Lights shown on for information only.

* SOME AIRPLANES



100F-1-479-28

Figure 1-19 (Sheet 2 of 2)

ENGINE FUEL CONTROL SYSTEM

- | | | | |
|--|----------------------------|--|--------------------------|
| | MAIN FUEL FLOW | | METERED AFTERBURNER FLOW |
| | EMERGENCY FUEL FLOW | | ENGINE COMPRESSOR AIR |
| | BY-PASS FLOW | | ELECTRICAL CONNECTION |
| | UNMETERED AFTERBURNER FLOW | | MECHANICAL LINKAGE |

NOTE: Lights shown illuminated for information only.

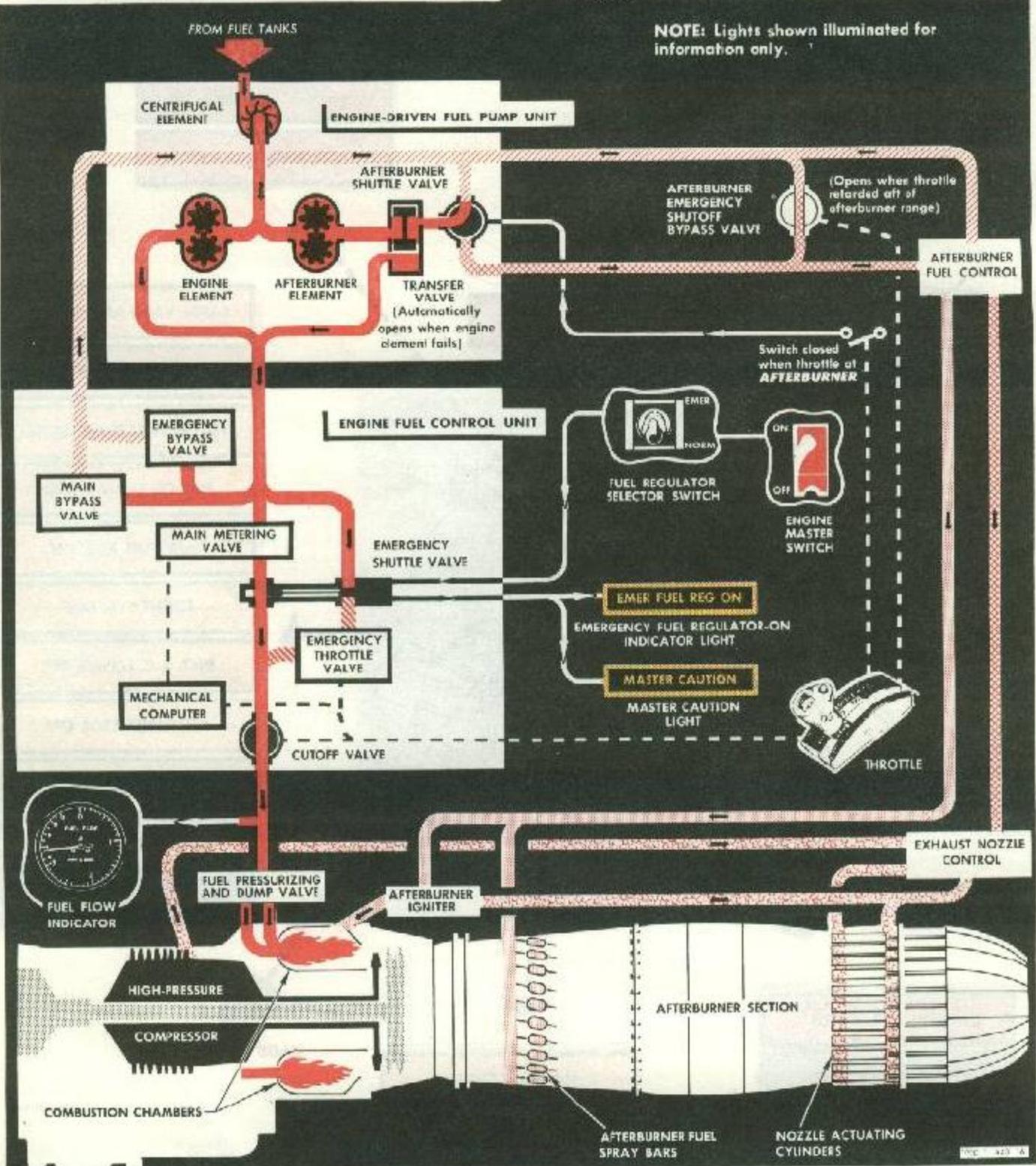


Figure 1-20

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 takeoff and before initial climb. At outside air temperatures of 60°F and above, the limiter will operate at about 0.80 to 0.85 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 1-20) 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 1-21), which is mechanically linked to the fuel control 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. The throttle in the rear cockpit cannot be moved to OFF (stop-cocked). If necessary, in an emergency, the rear cockpit occupant can shut down the engine by retarding the throttle to IDLE (to prevent damage to fuel lines) and moving the fuel system shutoff switch to OFF.

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 forward fuselage 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.

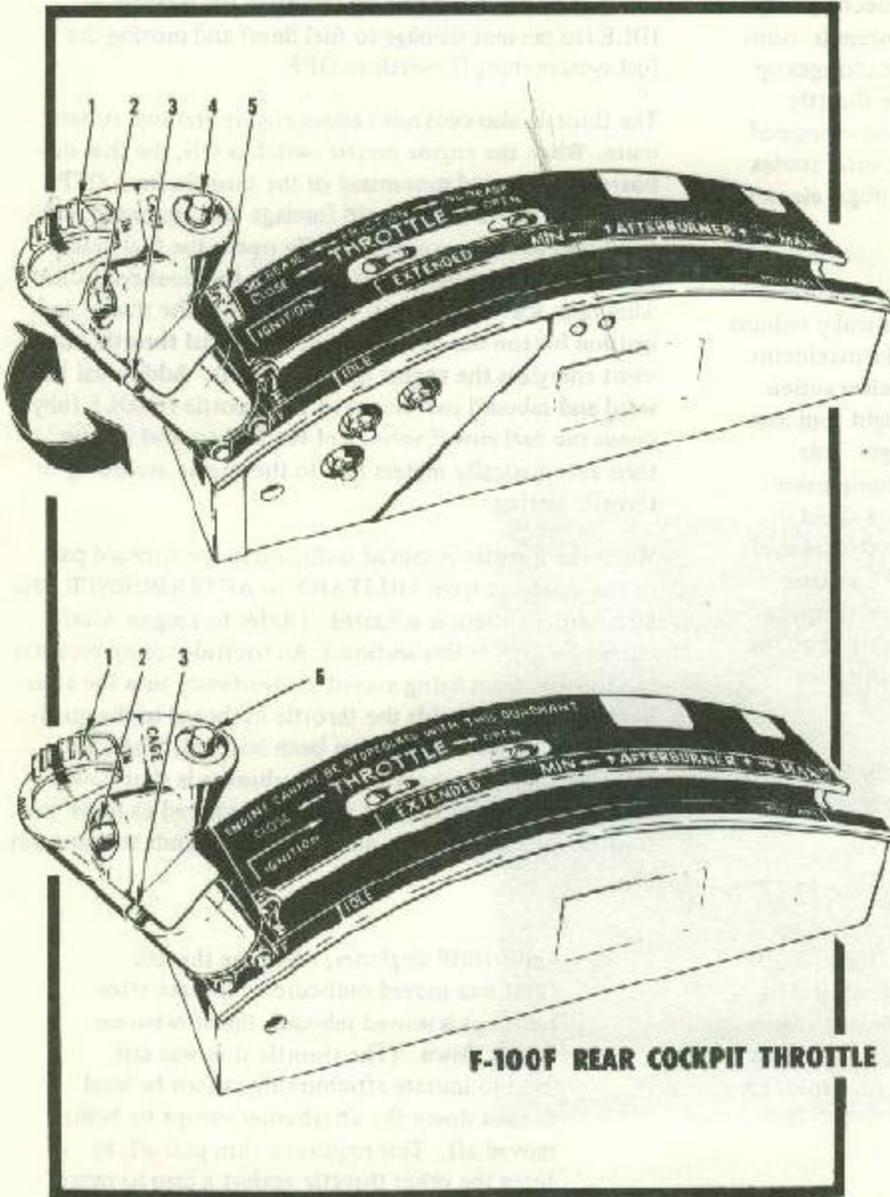
When the throttle is moved outboard in the forward part of the quadrant from MILITARY to AFTERBURNER, the afterburner system is actuated. (Refer to Engine Afterburner System in this section.) An override spring prevents the throttle from being moved inadvertently into the afterburner range and holds 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.

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. The afterburner in the F-100D may also be shut down in the same manner.)

When the throttle is retarded to OFF, the fuel booster pumps are de-energized, the wing tank scavenge pump

THROTTLES



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. LABS VERTICAL GYRO CAGING BUTTON

NOTE

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

F-100F REAR COCKPIT THROTTLE

THROTTLE PATHS

- LEADING THROTTLE
- ==== FOLLOWING THROTTLE

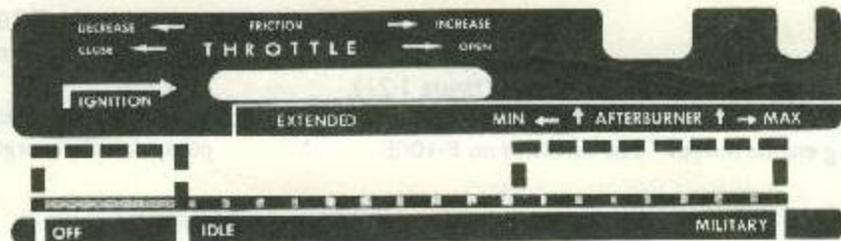


Figure 1-21

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 clockwise 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 1-21.) Moving the lever forward increases the friction on throttle travel. On F-100F airplanes, the rear throttle friction lever is preset and nonadjustable.

Engine Master Switch.

The engine master switch (figure 1-22) controls (by primary bus power) electrical power for various engine and fuel system units.

NOTE

On F-100F airplanes, both engine master switches must be ON for the circuits controlled by the master switch to be operable.

- The attitude indicating systems are inoperative until the engine master switch is ON.

When the switch is ON, the tank-mounted fuel transfer pumps are actuated if main ac bus power is available. Moving the master 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 booster, transfer, and scavenge pumps are shut off, and the ignition circuit is interrupted.

Fuel Regulator Selector Switch.

The primary-bus-powered fuel regulator selector switch (figure 1-22) 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 operations 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.) An indicator light in the cockpit comes on when the fuel regulator selector switch is at EMER.

Emergency Fuel Regulator-On Indicator Light.

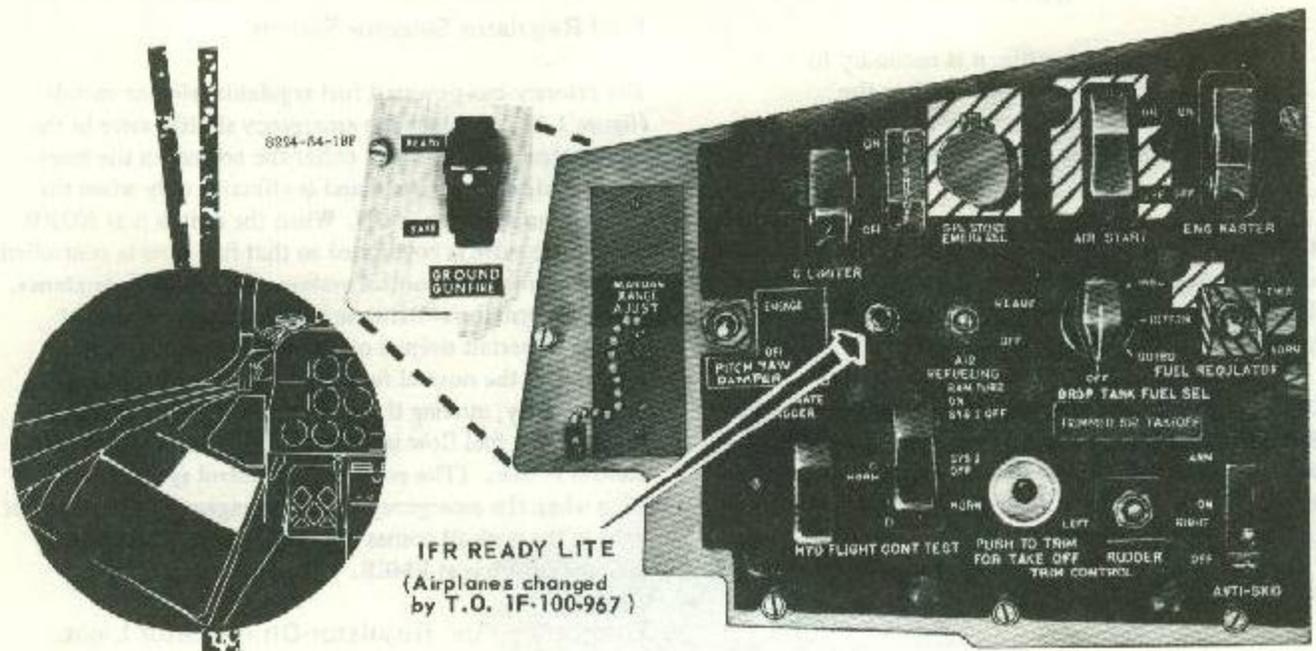
The placard-type emergency fuel regulator-on indicator light (figure 1-19) comes on when the emergency fuel control system is engaged by the fuel regulator selector switch. The light is powered by the primary bus, and operation of the bulbs in the light may be tested by the indicator light test circuit.

ENGINE INDICATORS.

Engine Pressure Ratio Gage.

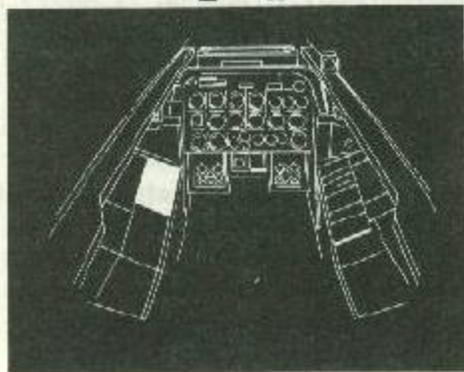
The engine pressure ratio gage (22, figure 1-6; 23, figure 1-7; 17, figure 1-12; 18, figure 1-13) shows the ratio of engine turbine discharge pressure to pitot pressure. The gage is used to determine whether engine thrust at full throttle is acceptable for takeoff. (Refer to Thrust-RPM Relationship in section VII.) Windows in the dial face show the takeoff pressure ratio and the cruise pressure ratio, which are adjustable by the index marker adjustment knob. Pushing in and turning the knob sets the takeoff pressure ratio (figure 2-5) and moves the takeoff index marker to the dial setting that corresponds to the figures in the TAKEOFF window.

ENGINE AND FLIGHT CONTROL PANEL



IFR READY LITE
 (Airplanes changed
 by T.O. 1F-100-967)

NOTE
 Lights shown on for information only.



F-100F REAR COCKPIT

Figure 1-22

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 may remain 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 1-12; 15, figure 1-13) shows engine exhaust temperature in degrees centigrade. Gage indications are received from the 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 1-12; 13, figure 1-13) 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.)

NOTE

Oil pressure will have a tendency to follow the throttle. This condition is normal provided pressure stabilizes between minimum and maximum limits.

Tachometer.

The tachometer (19, figure 1-6; 21, figure 1-7; 14, figure 1-12; 16, figure 1-13) registers engine speed in percentage of the approximate maximum rpm (9980) of the high-speed compressor rotor. The tachometer receives its power from a tachometer generator that is geared to the

engine accessory section driven by the high-speed 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 1-12; 17, figure 1-13) 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 should not be used for exact in-flight planning.

ENGINE STARTER AND IGNITION SYSTEMS.

Cartridge-Pneumatic Starter System.

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

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 behind the left expended link bay.) The cartridge starter loading breech is within an access panel near the external air receptacle. (See figure 1-41.) 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.) A switch, actuated by the external air source hose, makes the cartridge firing circuit inoperative when the hose is connected for a pneumatic start.

WARNING

When a misfire or hangfire occurs the cartridge must be removed before a pneumatic start is attempted. The engine must not be started nor the aircraft flown with a live cartridge remaining in the Starter Breech.

NOTE

Before a pneumatic start is made, the cartridge must be removed from the starter breech and stored.

- For cartridge malfunctions, refer to Engine Starter Cartridge Malfunctions in section VII.
- Cartridge starts should be made as required. Perform one pneumatic start for every four cartridge starts to assist in removing residue from the starter.

CARTRIDGE POWER-ON WARNING LIGHT. The cartridge power-on warning light (figure 1-41), 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.

STARTER AND IGNITION BUTTON. The starter and ignition button (figure 1-29), not in the rear cockpit, controls pneumatic and cartridge ground starts. Momentarily pressing the button (when the engine master switch is ON) supplies primary bus power to fire the cartridge. 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 1-22) 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 1-29) 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 1-29) 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.

NOTE

Afterburner operation cannot be obtained if the engine element of the engine-driven fuel pump fails.

AFTERBURNER FUEL CONTROL.

Fuel flow to the afterburner system is controlled and regulated by the afterburner fuel control. (See figure 1-20.) 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 7 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.

-21 Afterburner.

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.

-23 Afterburner.

The two-position exhaust nozzle is opened or closed to provide the proper exhaust area for either normal or afterburner engine operation. The nozzle flaps are moved to the full open position during afterburner operation and returned to the minimum nozzle opening area when the afterburner is not in use. Position of the nozzle flaps is accomplished automatically by means of the exhaust nozzle control unit. No emergency override control is included.

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 1-20.) This pressure, in turn, moves a valve in the nozzle control which directs compressor discharge air pressure to the nozzle actuators to open and 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 1-20.) 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 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 positioned mechanically by the throttle. (See figure 1-9.) When the throttle has been moved inboard and then retarded to approximately 82%, the bypass valve opens. If the afterburner is shut down non-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. Following emergency shutoff, the throttle may be readvanced to approximately 89% rpm without re-engaging the afterburner. If the afterburner is shut off normally the bypass valve has no effect on the system.

OIL SYSTEM.

The dry-sump, recirculating, pressure-type engine oil system is supplied from a tank on the left side of the engine compressor section. (The total oil capacity is 5.5 US gallons with an additional 1.6-gallon expansion space in the tank.) 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 1-41 for oil specification.)

OIL OVERHEAT CAUTION LIGHT.

The placard-type oil overheat caution light (figure 1-19) 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 forward fuselage 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 1-23; fuel specifications are given in figure 1-41.

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.

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 Standard Day fuel weight of 6.9 pounds per gallon.

- These values are based on optimum airplane altitude, including strut inflation. Under operational conditions, usable fuel totals will be somewhat less.



1000-1-448-28

	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	713	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	

Figure 1-23

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 forward fuselage 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.

AIRPLANE

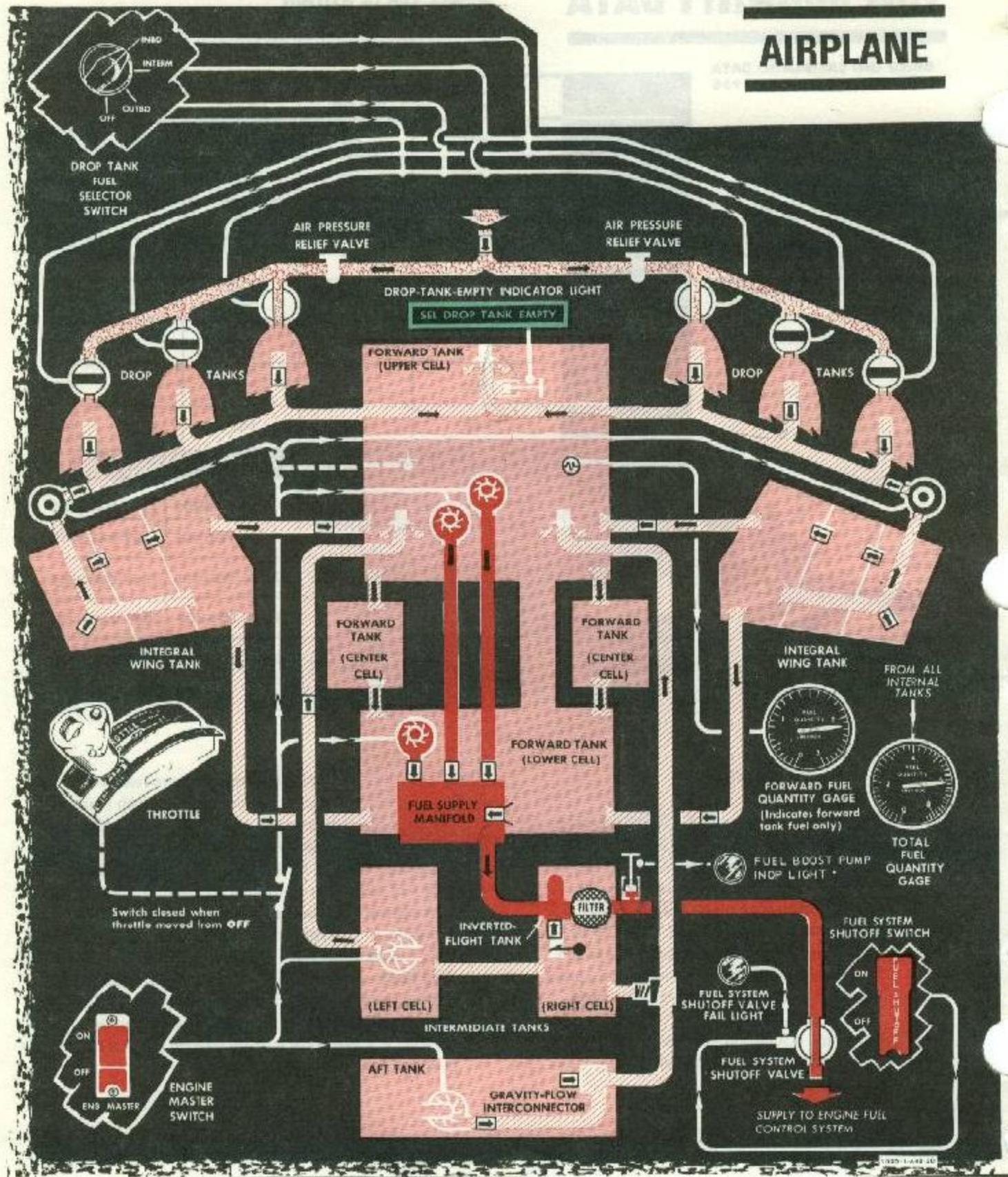


Figure 1-24 (Sheet 1 of 2)

FUEL SYSTEM

NOTE
Refer to "Pressure Refueling System" in Section IV.



Some airplanes

NOTE
Boost pump in forward tank lower cell and the wing tank scavenge pumps are primary bus powered. All other boost and transfer pumps are powered by the main ac bus.

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 and main ac bus power is available, but do not transfer fuel until the fuselage forward tank fuel level control valves open and admit fuel.

NOTE

If the aft 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.

DC Fuel Boost Pump Test Switch – Airplanes Changed by T.O. 1F-100-1009.

The fuel boost pumps can be checked for operation (on the ground only) through a two-position switch decaled "DC PUMP BOOST PUMP TEST" (17, figure 1-10; 20, figure 1-11; 18, figure 1-15; 18, figure 1-16) on the right console of the front cockpit. The switch is spring-loaded to the ON position. With the engine running and with the ac generator switch OFF (to disable the ac powered boost pumps), moving the fuel boost pump test switch to OFF shuts down the dc-powered boost pump and turns on a fuel boost pump inop light in the cockpit. The switch is powered by the primary bus.

Figure 1-24 (Sheet 2 of 2)

Fuel Boost Pump Inop Light — Airplanes Changed by T.O. 1F-100-1009.

This amber, dimmable, press-to-test light, placarded "BOOST PUMP INOP" (37, figure 1-6; 31, figure 1-7) on the instrument panel of the front cockpit, provides a fuel boost pump failure warning indication during flight, and is used as an indicator for the fuel boost pump ground test operation. When power is first applied to the airplane, the light is on. The light goes out almost immediately (when boost pump pressure, sensed by a pressure switch on the main fuel manifold, rises above 10 psi). During flight, the light comes on if boost pump pressure, sensed by the same pressure switch, falls below 5 psi. In the preflight fuel boost pump check, the light comes on when ac power is removed from the airplane (to disable the ac-powered boost pumps) and the fuel boost pump test switch is moved to OFF. The light is powered by the primary bus. Refer to Airplane Fuel System Failure in section III.

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

AIRPLANE FUEL SYSTEM CONTROLS AND INDICATORS.

Fuel System Shutoff Switch.

Moving the fuel system shutoff switch (figure 1-22) to ON opens the fuel system shutoff valve. Moving the switch to OFF closes the fuel system shutoff valve. The switch is safetied in the ON position, and should remain ON during normal engine operation. On F-100F airplanes, the switch in the rear cockpit must be ON to control shutoff valve operation from the front cockpit. Moving the switch from OFF to ON momentarily turns on the fuel system shutoff valve fail light. The fuel system shutoff switch is powered by the primary bus. If the fuel system shutoff 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 13 seconds from Military Thrust and 10 seconds from 70% thrust. The use of the fuel system shutoff switch is not comparable to throttle action.

NOTE

When using the fuel shutoff switch to shut down the engine, thrust decrease will occur more rapidly as altitude increases.

Fuel System Shutoff Valve Fail Light.

This red button-type light (figure 1-35), not in rear cockpit, comes on, if the primary bus is energized, when the fuel system shutoff valve is in any position other than full open, a fault exists in the valve or light system circuitry, or a component failure or a fault in the circuitry. It is a press-to-test light and is not included on the indicator light test circuit. Flickering of the light indicates an impending component failure or a fault in the circuitry.

Drop Tank Fuel Selector Switch.

Drop tank fuel is controlled by a four-position selector switch (not in the rear cockpit). (See figure 1-22.) When the switch 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 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.

External Load Emergency Jettison Button.

Refer to Jettison of External Loads in section III. Refer to Bombing Equipment Controls in section IV.

External Load Auxiliary Release Buttons.

Refer to Jettison of External Loads in section III. Refer to Bombing Equipment Controls in section IV.

External Load Emergency Jettison Handle.

Refer to Jettison of External Loads in section III. 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 1-12; 20, figure 1-13) 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 1-12; 21, figure 1-13) that indicates the amount of fuel in the forward fuselage tank. Because all fuel is transferred to the forward fuselage 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.

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. (See 26 and 31, figure 1-6; 27, figure 1-7.) 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 Fuel Quantity Gage Test Button.

Refer to Pressure Refueling System in section IV.

Drop-tank-empty Indicator Light.

A tertiary-bus-powered placard-type light (figure 1-19) comes on when the selected drop tanks become empty. The drop-tank-empty indicator light is inoperative when the drop tank fuel selector is OFF. Bulbs within the light can be checked by the indicator light test circuit.

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 standby 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 1-25 and 1-26.)

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.

AC electrical 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 power transformer fails, the 3-phase ac instrument bus can be energized by the primary dc bus-powered standby instrument inverter. (See figures 1-25 and 1-26.)

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 1-41 for oil specification.)

Standby Instrument Inverter.

The standby 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 standby inverter switch is ON. When the air start switch is ON, ac generator power is removed from the instrument busses and the standby instrument inverter is energized automatically to power these busses for instrument operation during an air start. When the standby instrument inverter is operating, the instrument busses are disconnected from the main 3-phase ac bus.

ELECTRICALLY OPERATED EQUIPMENT.

See figures 1-25 and 1-26.

EXTERNAL ELECTRICAL POWER RECEPTACLES.

The ac and dc external electrical power receptacles (figure 1-41) 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 operating.

NOTE

If only an ac external power source is available, the primary bus must be hot to apply external ac power to the airplane.

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 1-27 and 1-28.)

ELECTRICAL POWER SUPPLY SYSTEM CONTROLS.

Battery Switch.

With the battery switch (figure 1-29) 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 1-29) 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. 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.

F-100D ELECTRICAL

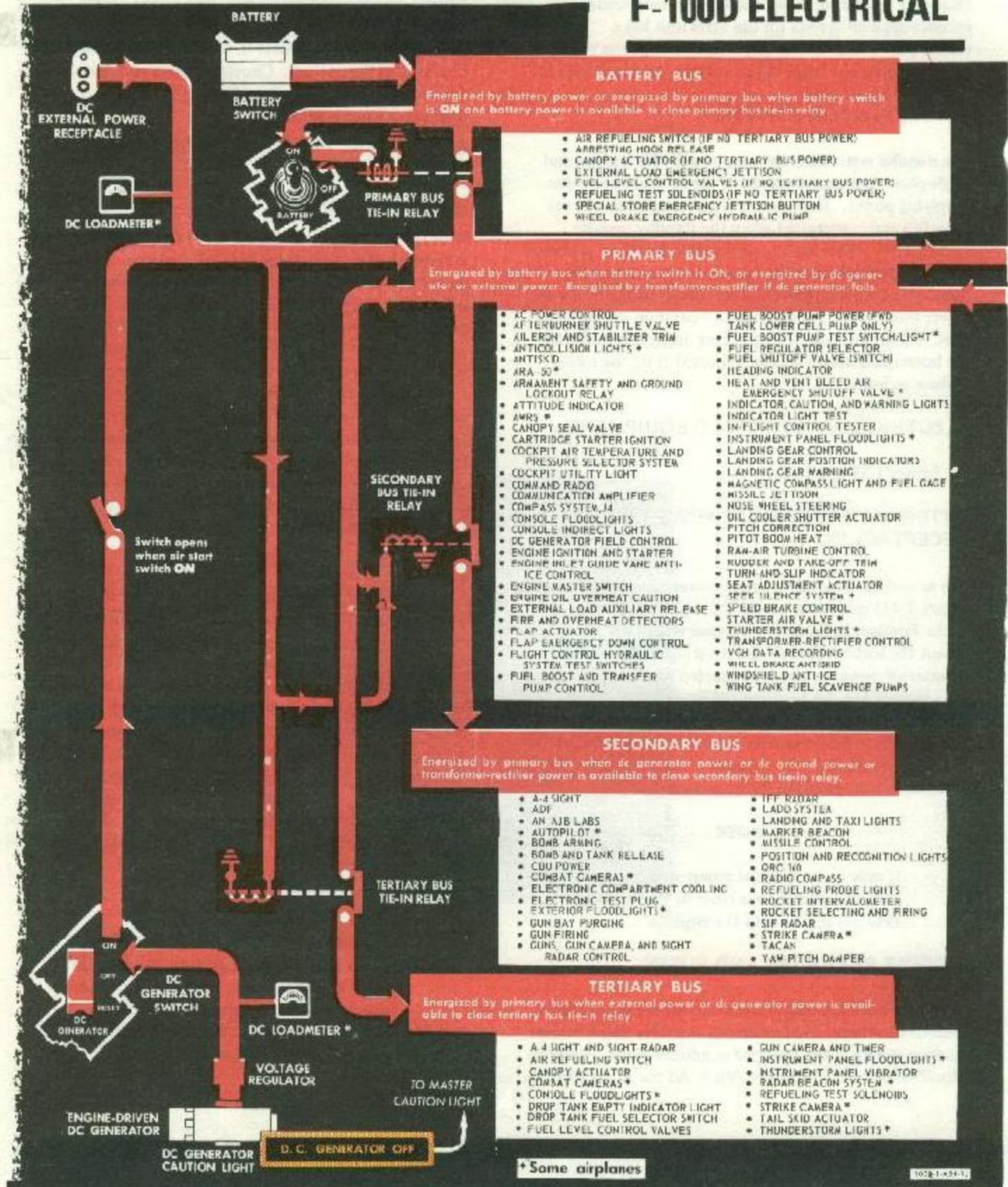


Figure 1-25 (Sheet 1 of 2)

POWER DISTRIBUTION

FUNCTIONAL FLOW DIAGRAM

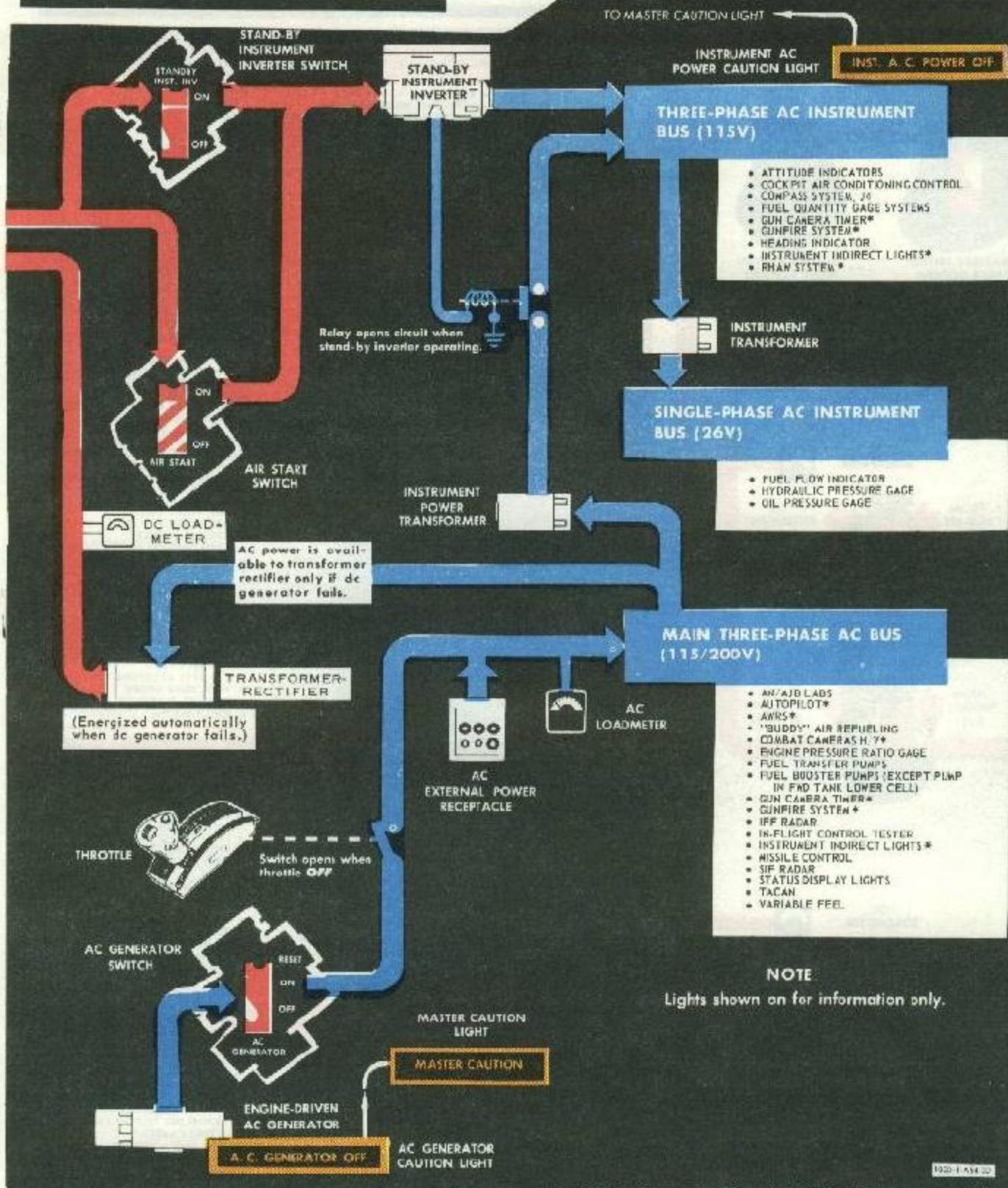


Figure 1-25 (Sheet 2 of 2)

F-100F ELECTRICAL POWER DISTRIBUTION

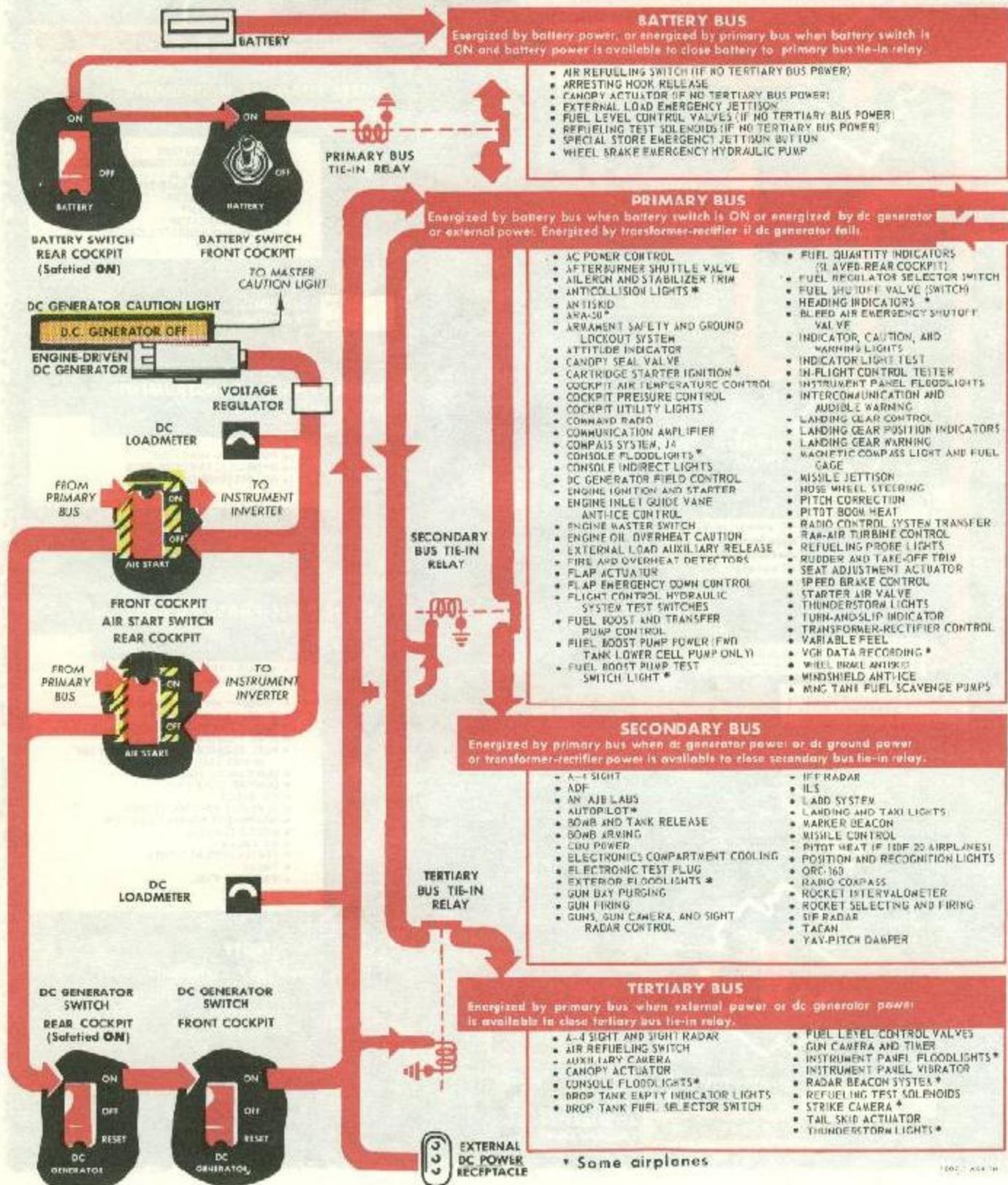
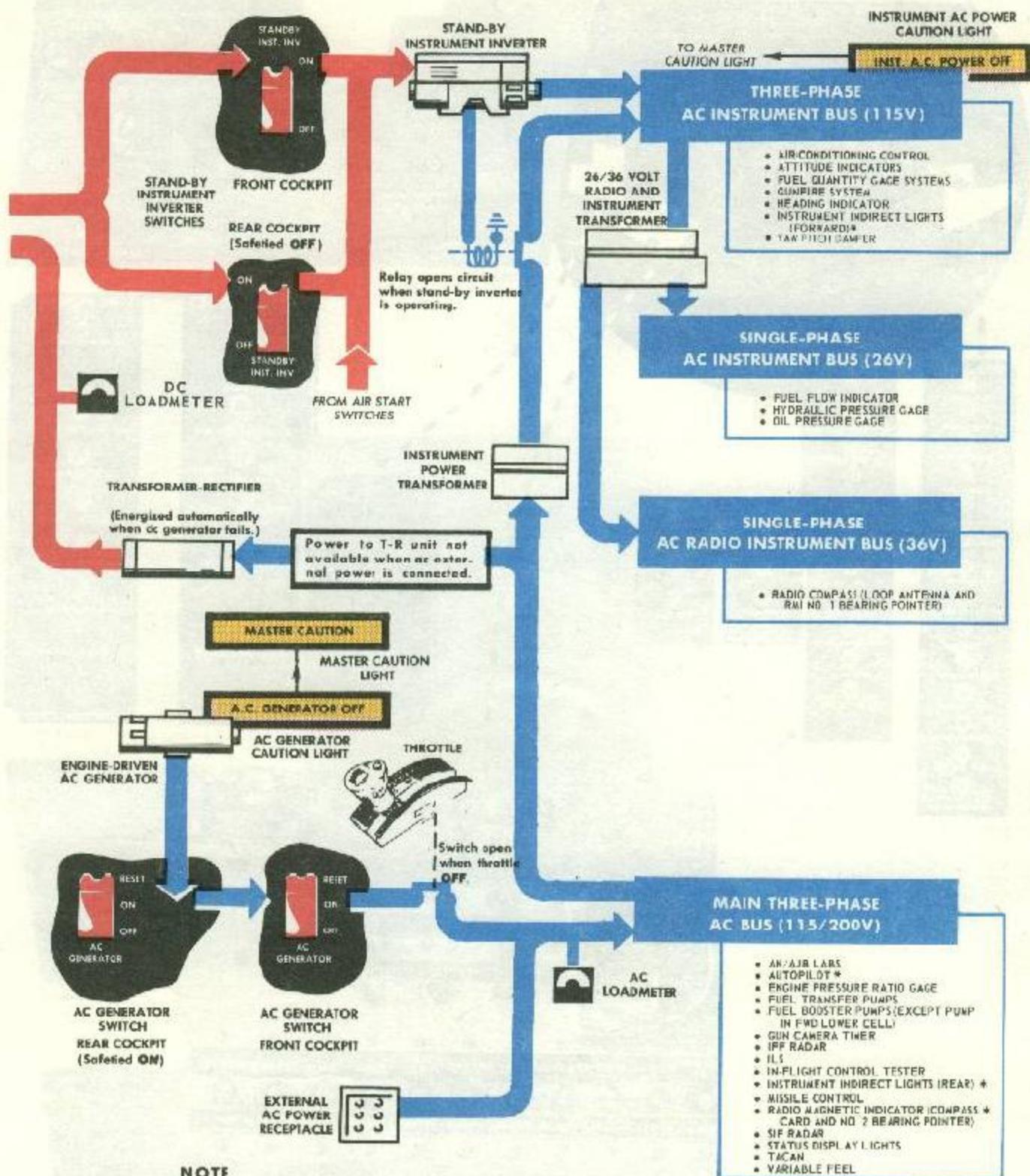


Figure 1-26 (Sheet 1 of 2)

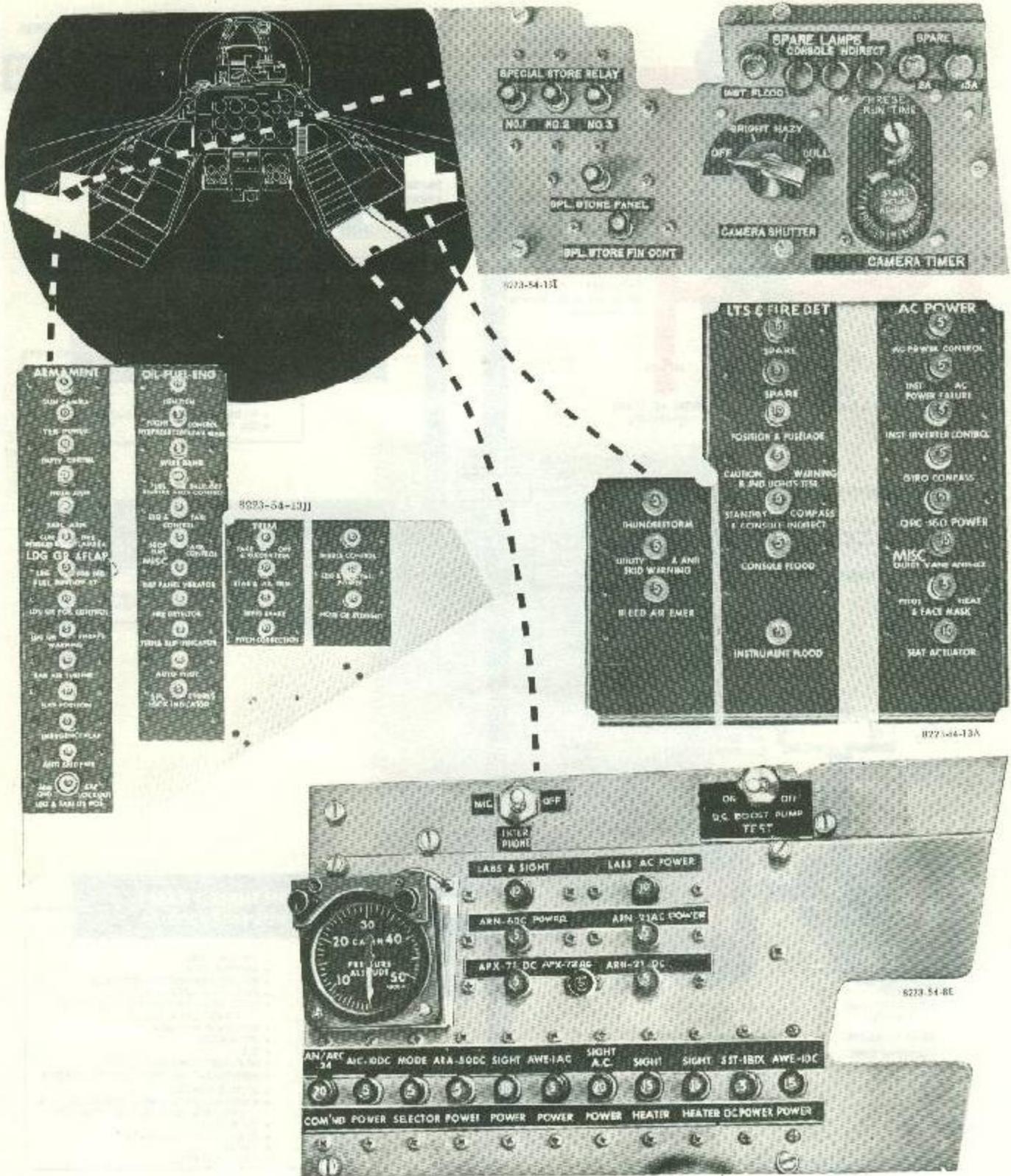
FUNCTIONAL FLOW DIAGRAM



NOTE
Lights shown on for information only.

Figure 1-26 (Sheet 2 of 2)

F-100D CIRCUIT -BREAKER PANELS



8023-54-131

8023-54-131J

8273-54-13A

8273-54-8E

Figure 1-27 (Sheet 1 of 2)

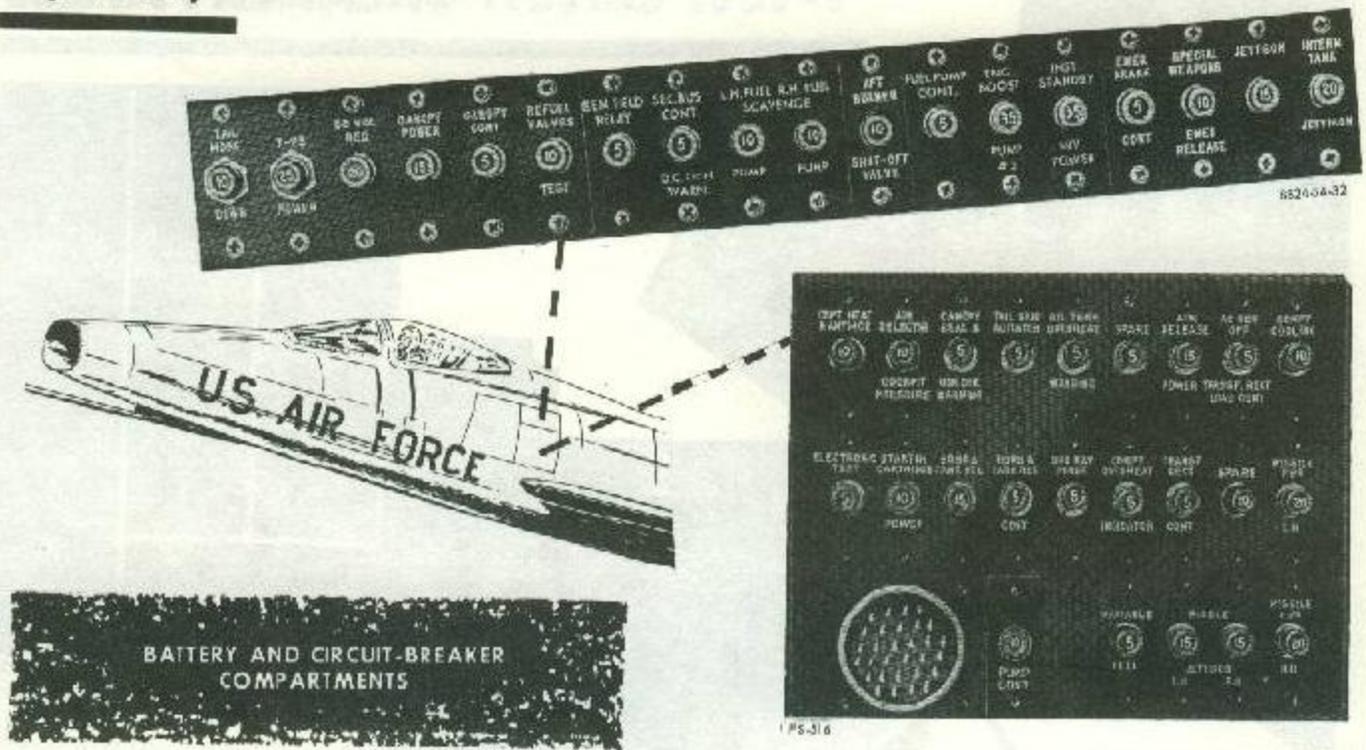
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Figure 1-27 (Sheet 2 of 2)

AC Generator Switch.

A three-position switch (figure 1-29) 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, or the throttle is moved to the OFF position.

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.

Standby Instrument Inverter Switch.

The standby instrument inverter switch (figure 1-29) controls primary bus power to energize the standby 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 standby 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 standby inverter, even though the inverter switch is OFF.

ELECTRICAL CONTROL PANELS

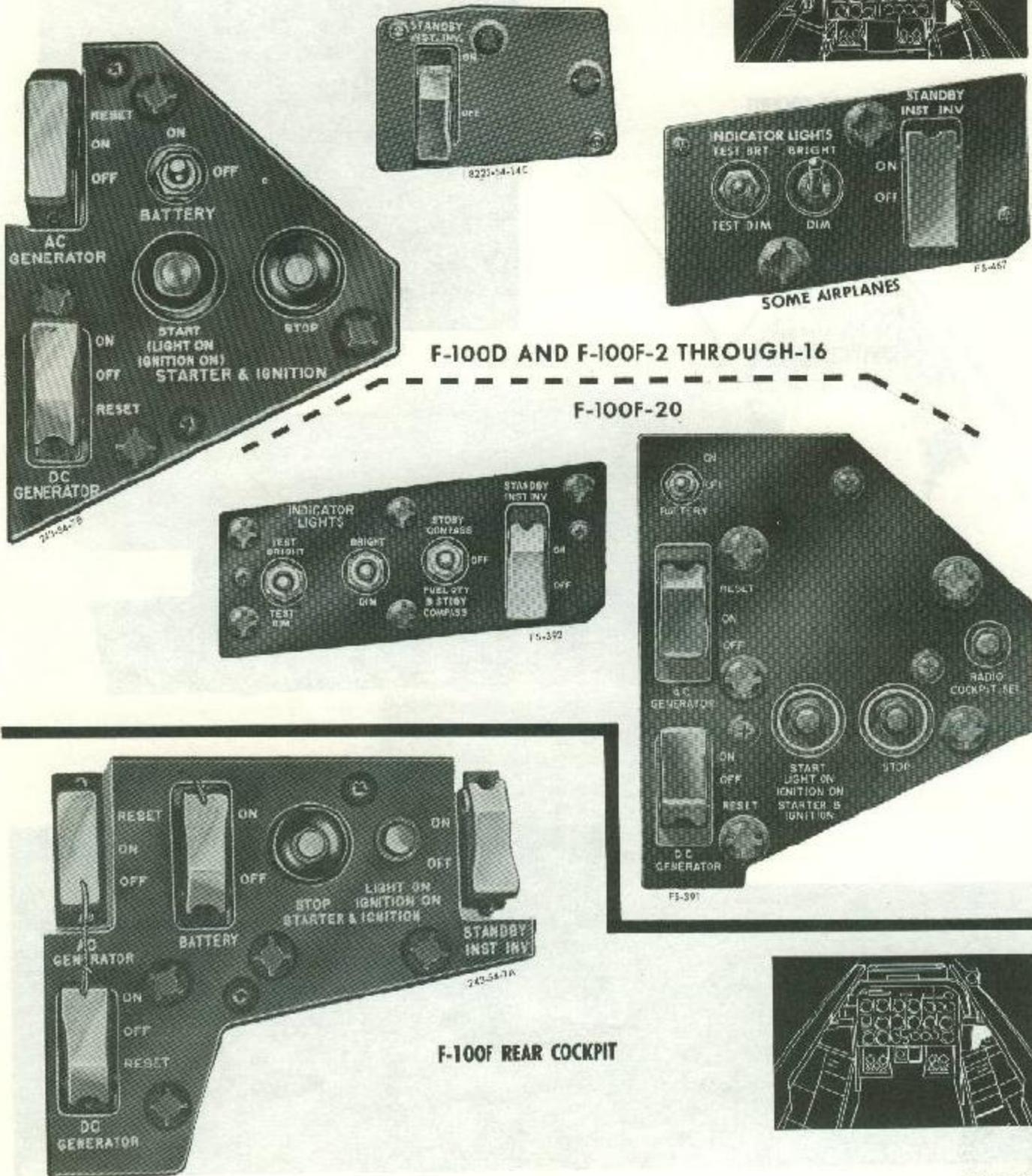


Figure 1-29

100F-1-4754-90

ELECTRICAL POWER SUPPLY SYSTEM INDICATORS.

DC Generator Loadmeter.

The dc loadmeter (5, figures 1-6 and 1-7; 26, figure 1-12; 3, figure 1-13) 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 (standby dc system) is in operation.

AC Generator Loadmeter.

The ac loadmeter (3, figure 1-6; 4, figure 1-7; 25, figure 1-12; 1, figure 1-13) 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 1-19) 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 1-19) 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 1-19) 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 standby 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 standby 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 1-41.

UTILITY HYDRAULIC SYSTEM.

The utility hydraulic system (figure 1-30) 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 purge door, and the 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, 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. The rudder is powered by the utility hydraulic system. If this pressure falls or becomes too low, No. 2 flight control hydraulic system pressure is automatically supplied to the rudder.

HYDRAULIC PRESSURE GAGE AND GAGE SELECTOR SWITCH.

The hydraulic pressure gage (15, figure 1-6; 17, figure 1-7; 13, figure 1-12; 10, figure 1-13) and the gage selector

UTILITY HYDRAULIC

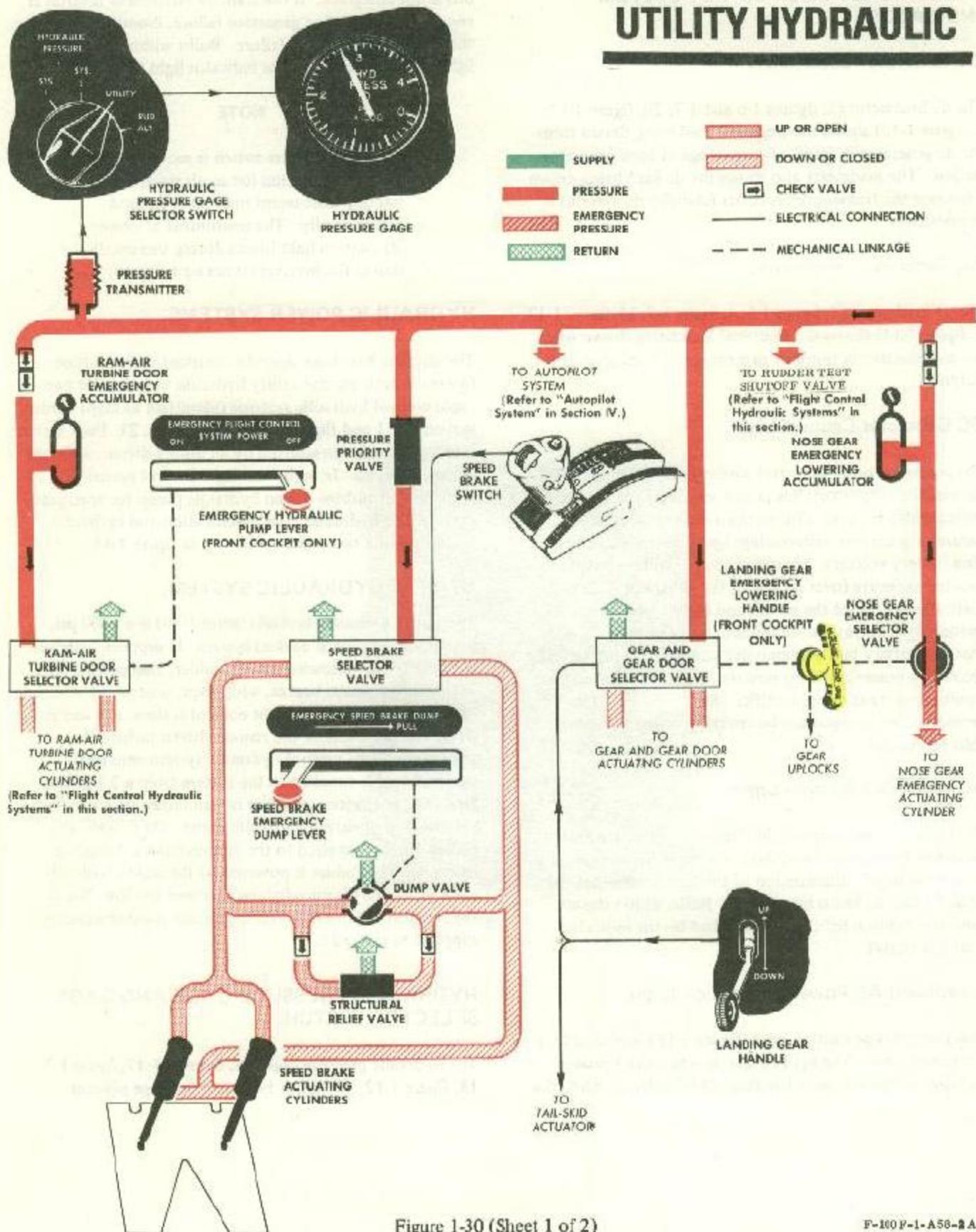


Figure 1-30 (Sheet 1 of 2)

F-100 P-1-A50-2A

SYSTEM

NOTE
Caution lights shown illuminated for information only.

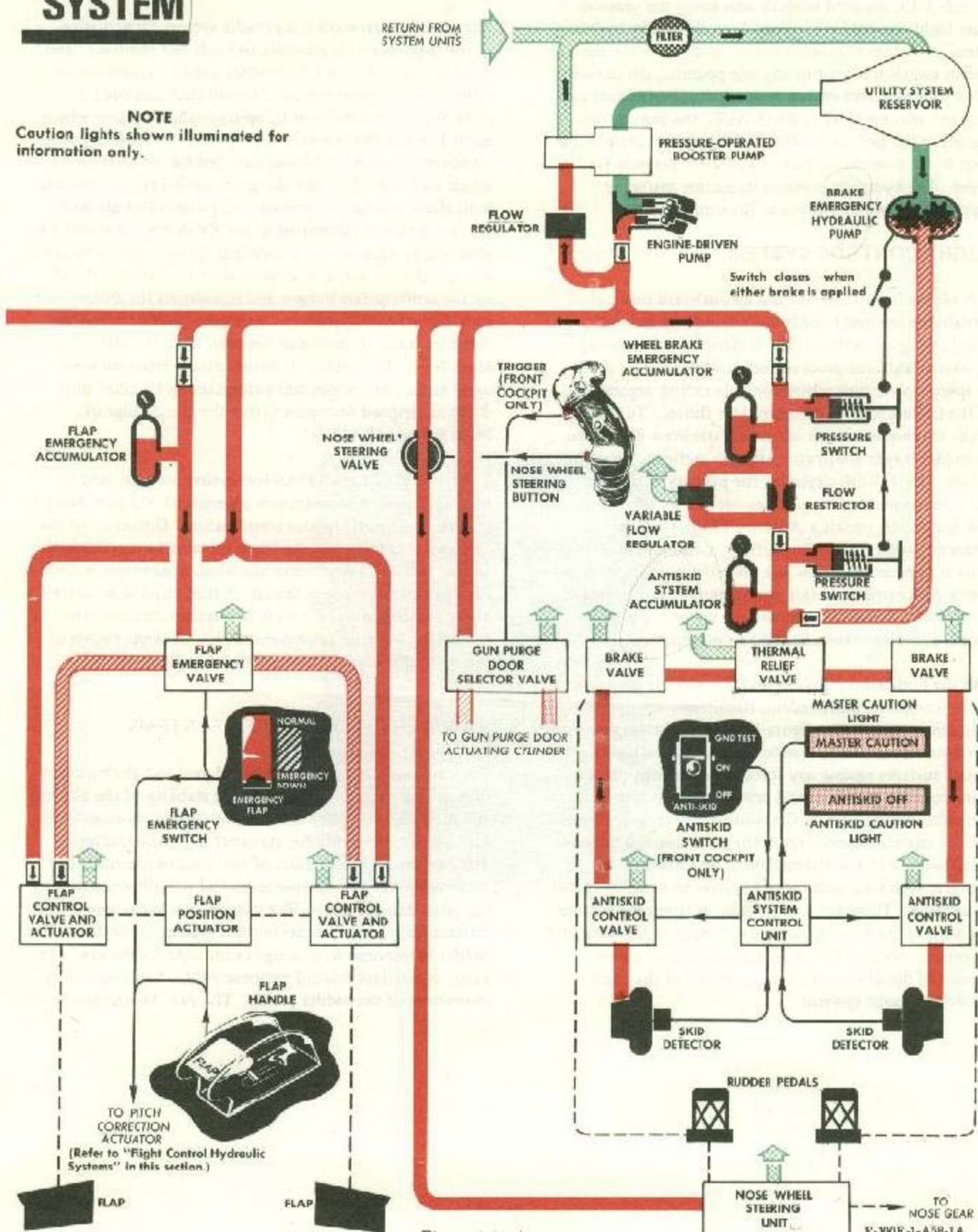


Figure 1-30 (Sheet 2 of 2)

TO NOSE GEAR
F-100F-1-A38-1A

switch (14, figure 1-6; 15, figure 1-7; 12, figure 1-12; 9, figure 1-13) 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 improve the basic aerodynamic direction and longitudinal damping of the airplane. When the dampers are engaged, the yaw damper provides automatic rudder coordination.

Both the horizontal stabilizer and the ailerons are actuated by two complete, independent, simultaneously operating hydraulic systems. (See figure 1-33.) 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 0.8 and Mach 0.94. The airplane is automatically trimmed nose up as airspeed increases and automatically trimmed nose down as airspeed decreases within the speed range of Mach 0.8 and Mach 0.94.

The bungees of the artificial-feel system are also used for trim purposes. When dampers are engaged, the yaw damper provides automatic rudder coordination. 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 horizontal stabilizer control system, reduces trim system lag and trim system overshoot. A single switch in the cockpit trims all control surfaces to their takeoff positions.

YAW AND PITCH DAMPER SYSTEMS.

The yaw and pitch dampers control yaw and pitch oscillations of the airplane. They increase stability of the airplane about its yaw and pitch axes, automatically coordinate all turns, and 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

YAW AND PITCH DAMPER SYSTEMS

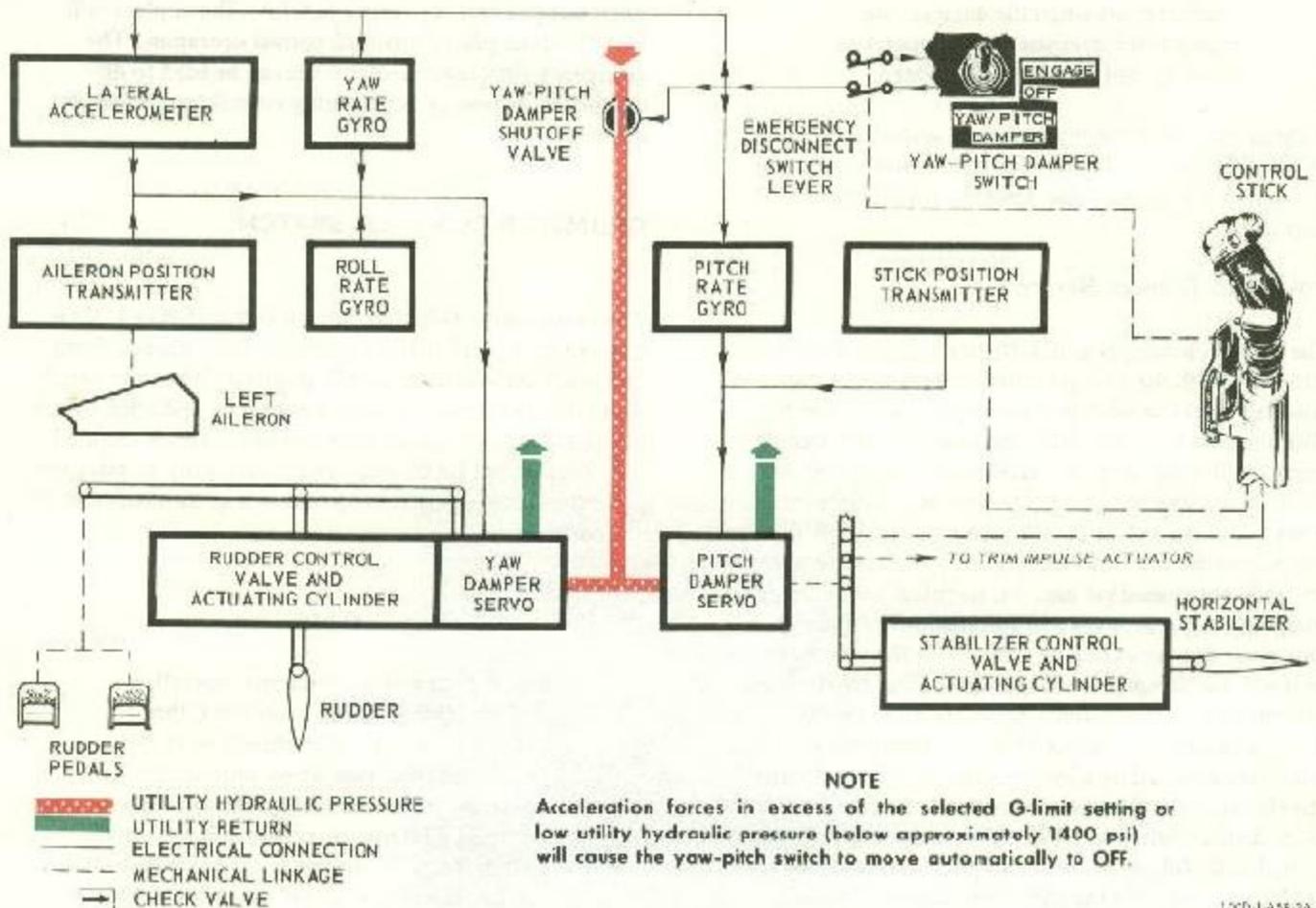


Figure 1-31

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 stick. 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 switch 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 part of the pitch damper servo prevents excessive return pressure surges that could cause a pitch control system malfunction.

Yaw-Pitch Damper Switch.

The yaw-pitch damper switch (figure 1-22) controls simultaneously both the yaw and pitch dampers. The switch is powered by the secondary bus and main 3-phase ac bus. With the switch at ENGAGE, 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 OFF, the yaw and pitch dampers are inoperative, but the electrical components are warmed up ready for immediate use. An electrical power failure de-energizes the dampers and automatically returns the yaw-pitch damper switch to OFF. With the switch in this position, the dampers 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 that opens the electrical circuits and automatically positions the yaw-pitch damper switch to OFF. After momentary electrical or hydraulic failure, the yaw and pitch dampers may be restored by resetting the yaw-pitch damper switch to ENGAGE 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 moving the yaw-pitch damper switch to OFF, or by use of the damper emergency disconnect switch lever.

Damper Emergency Disconnect Switch Lever.

The damper emergency disconnect switch lever (figure 1-32) is on the control stick. Pressing this switch causes the yaw-pitch damper switch to move to OFF. The airplane will then be under pilot-controlled normal operation. The emergency disconnect switch lever can be used to disengage the damper systems during normal operations, if desired.

G-LIMITER CONTROL SWITCH.

The two-position G-limiter control switch (figure 1-22) is covered by a guard that is safety-wired and clipped down and holds the switch in the ON position. When the switch is at OFF, the damper system is no longer restricted by the preset G-limits of the G-limiting system. This is required only for combat LABS maneuvers. Authority to place the G-limiter control switch in operation is at the discretion of the commander.

NOTE

For normal yaw-pitch damper operation and for training LABS maneuvers, the G-limiter control switch should be at ON. In combat situations where unrestricted operation of the damper system throughout the LABS maneuver is mandatory, the switch should be moved to 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 or external stores when the switch is at OFF.

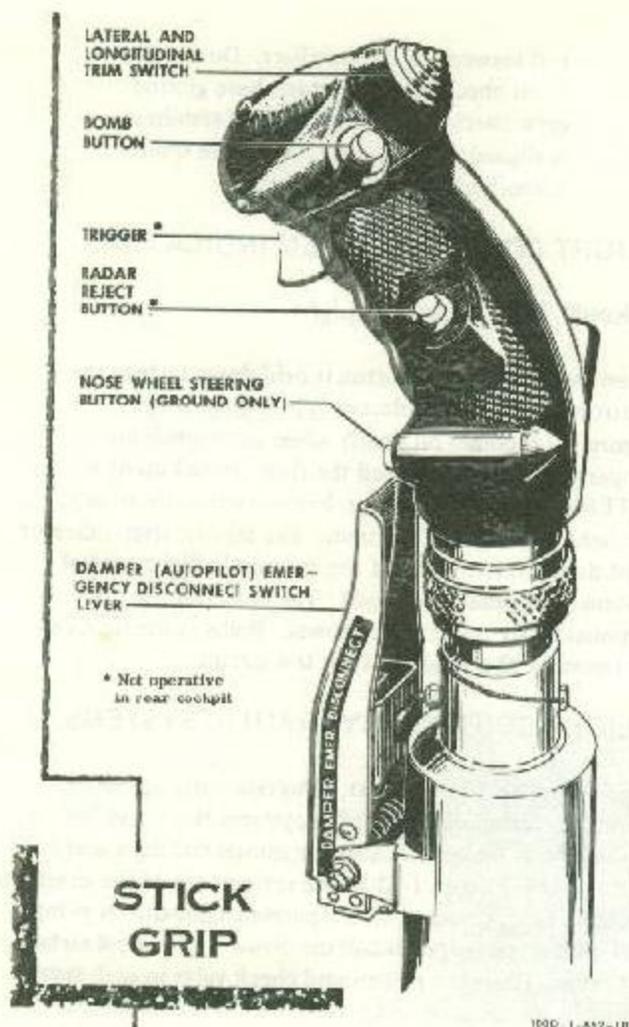


Figure 1-32

FLIGHT CONTROLS.

Control Stick.

The control stick is mechanically connected to hydraulic control valves at the aileron and horizontal stabilizer hydraulic actuators. The control stick grip (figure 1-32) incorporates the lateral and longitudinal trim switch, nose wheel steering button, trigger, bomb button, and radar reject button. The damper 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. The wheel brakes are applied by toe action on the rudder pedals. On F-100F airplanes, the rudder pedals in each cockpit are interconnected. Rudder pedal movement also controls nose wheel steering.

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 1-32.) 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.

Rudder Trim Switch.

Rudder trim operation is controlled by primary bus power through a three-position switch. (See figure 1-22.) When

the switch is held at either LEFT or RIGHT, the rudder trim actuator is energized accordingly and repositions the rudder system artificial-feel bungees 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 yaw damper is engaged.

Takeoff Trim Button.

All control surfaces can be trimmed at the same time to proper position for takeoff by a pushbutton switch. (See figure 1-22.) 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 takeoff. (The takeoff 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 27,000 pounds (29,000 pounds*) gross weight. (The trim speed can vary considerably with changes in gross weight, center of gravity, altitude, external store loading, and friction within the control system.) Above this speed, it may be necessary to retrim the airplane because of the trim tolerance.

When the button is held down, an indicator light comes ON, indicating the control surfaces have reached the proper position for takeoff if the wing flaps are full up or at INTERMEDIATE. To stop trim operation, the button must be released.

CAUTION

Illumination of the takeoff trim light indicates flight control actuators are positioned. Malfunctions are possible where the takeoff trim light is on and control surfaces are not properly aligned.

NOTE

The takeoff 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 pre-flight check of trim system, have ground crew check that leading edge of stabilizer is aligned with aft apex of triangle when takeoff trim button is pressed.

FLIGHT CONTROL SYSTEM INDICATORS.

Takeoff Trim Indicator Light.

When the takeoff trim button is held down to trim the controls for takeoff, a placard-type indicator light (figure 1-22) 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 takeoff 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 1-33.) The systems are of the constant-pressure type, powered by a separate engine-driven pump, and each system supplies half the demand of control surface actuators. There is a run-around check valve in each system between the pressure and return lines of the horizontal stabilizer actuator 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 flight surface hydraulic actuator control valves are positioned mechanically by stick or rudder pedal

*F-100F Airplanes

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 7-3.) 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. 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 1-10; 12, figure 1-11; 10, figure 1-15, and 9, figure 1-16), 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.

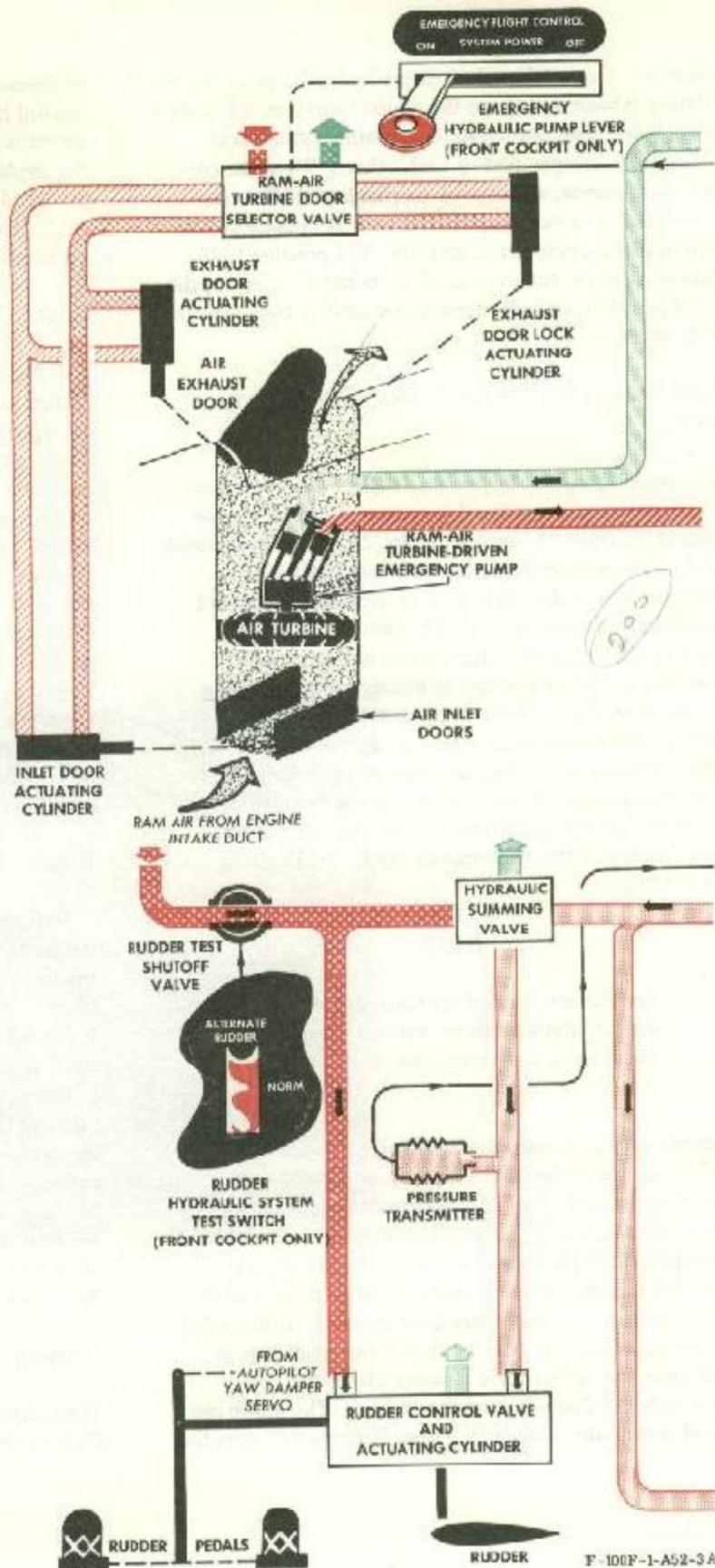
A preflight operational check of the summing valve in the rudder hydraulic control system can be made by means of the two-position test switch (not in the rear cockpit). (See figure 1-22.) When the switch is held at ALTERNATE RUDDER (RUDDER ALT SYS), primary bus power closes the test valve in the utility system pressure line to the rudder actuator. This shuts off normal utility hydraulic pressure to the rudder and allows the summing valve to direct alternate (No. 2 flight control) hydraulic system pressure 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 utility pressure to return and close off the No. 2 system pressure to the rudder.

Ram-air Turbine Test Button.

The automatic starting system of the ram-air turbine-driven flight control emergency hydraulic pump can be tested

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.

F-100F-1-A52-3A

Figure 1-33 (Sheet 1 of 2)

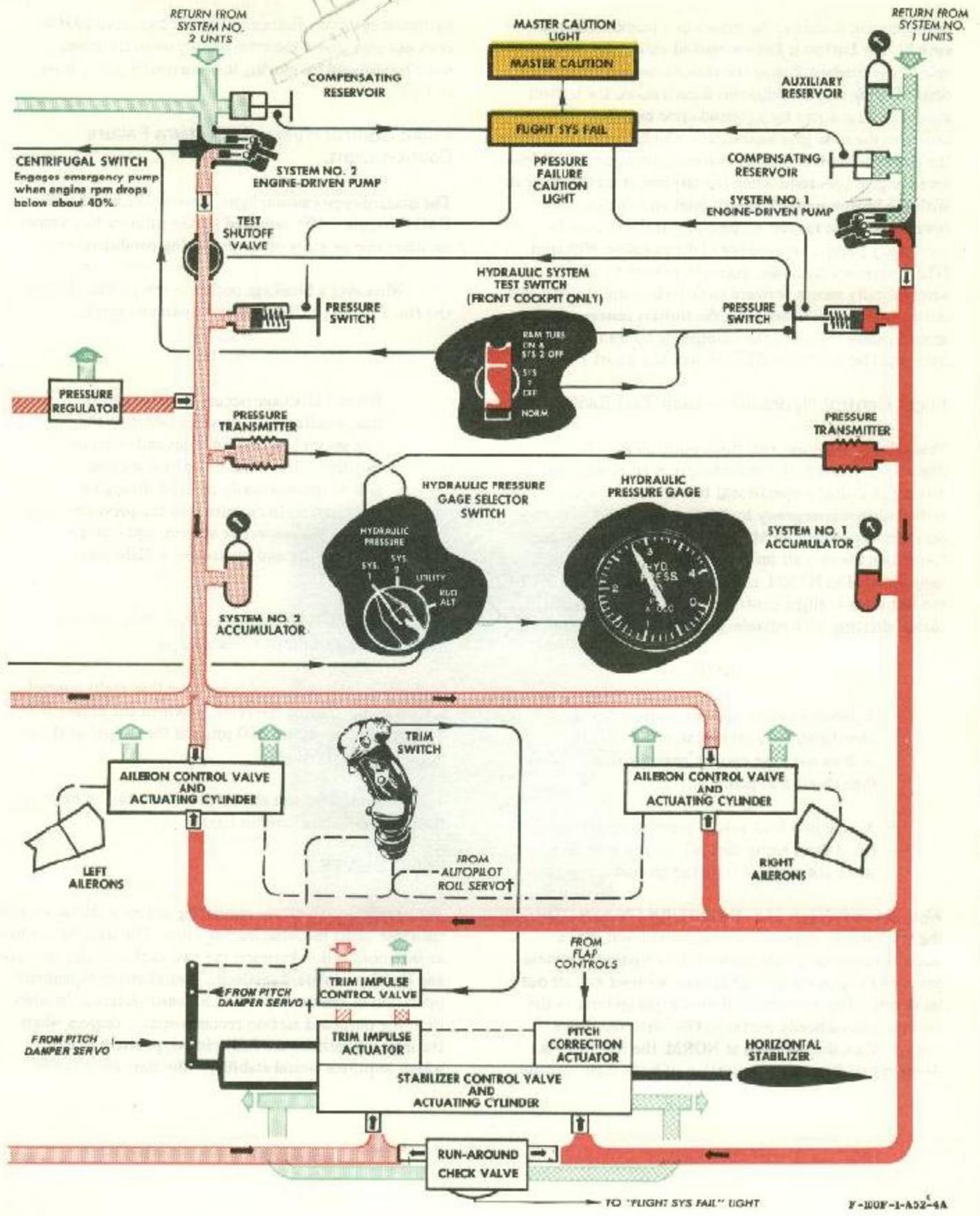


Figure 1-33 (Sheet 2 of 2)

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 1-22), 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 650 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.

Flight Control Hydraulic Systems Failure Caution Light.

The placard-type caution light, labeled "FLIGHT SYS. FAIL" (figure 1-19), powered by the primary bus, comes on when one or more of the following conditions exist.

1. 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.

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

3. 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 moveable wing slats, consisting of five sections, extend spanwise along the wing leading edge. 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. 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.

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 takeoff 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 or the emergency switch actuation and not on actual wing flap operation.

F-100F-20 airplanes have ducted wing flaps which have a full flap travel of 40 degrees. When the ducted wing flaps are lowered, a spanwise duct, built into the leading edge, directs air from the lower surface of the flaps to the upper surface for reducing wing flap buffet when in landing configuration. The flap retraction time on these airplanes is about 4 seconds. Flap extension varies with the airspeed at which the flaps are operated.

WING FLAP HANDLE.

The airfoil-shaped wing flap handle (12, figures 1-8 and 1-9; 13, figure 1-14; 9, figure 1-17) 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, figures 1-8, 1-9, and 1-14; 11, figure 1-17) 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 fully lower the flaps if the airspeed is below about 180 knots IAS. 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.

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. With engine at 60% rpm, the speed brake retraction time should not exceed 7 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 1-34.) The lock assemblies, which have conventional red warning streamers, must be removed before flight.

SPEED BRAKE SWITCH.

A serrated switch on the throttle (figure 1-21) 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.

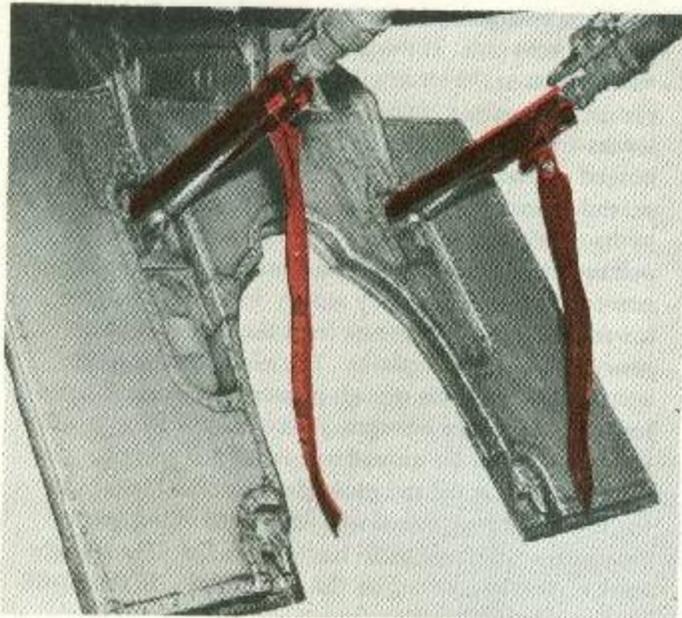
SPEED BRAKE EMERGENCY DUMP LEVER.

The speed brake can be retracted in flight, if normal operation fails, by means of a dump lever. (See 6, figures 1-8 and 1-9; 3, figure 1-14; 6, figure 1-17.) 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.

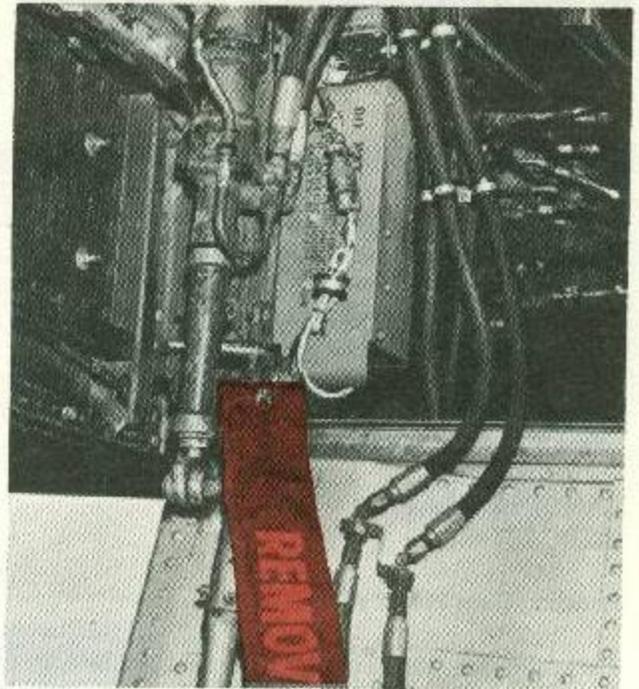
LANDING GEAR SYSTEM.

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. A nose gear load switch prevents engagement of the nose wheel steering system when the weight of the airplane is off the nose gear. On airplanes changed by T.O. 1F-100-1031, the nose gear load switch is also used for identifying inputs to the VGH data recording system. 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

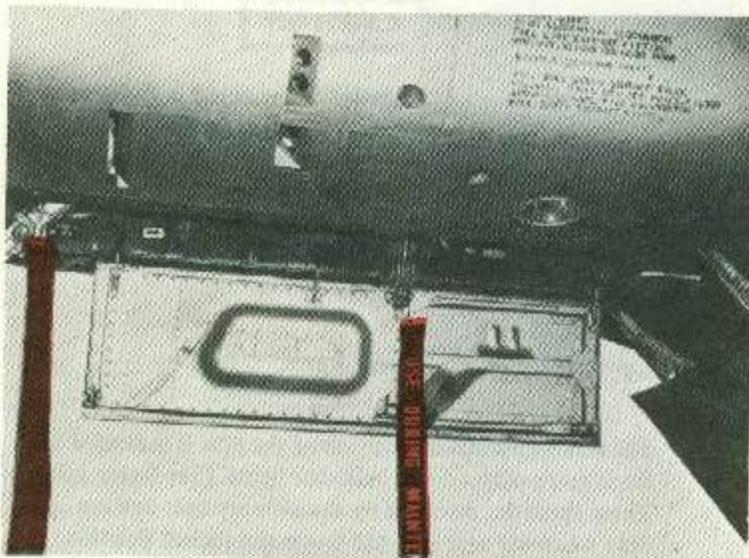
GROUND SAFETY LOCKS



SPEED BRAKE



MAIN GEAR DOOR
(TYPICAL)



NOSE GEAR AND
NOSE GEAR DOOR



MAIN GEAR (TYPICAL)

WARNING

Remove all ground safety devices before flight.

Figure 1-34

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 1-34.) Ground safety locks are also provided for the open position of the main and nose gear wheel well doors. The locks have regulation red warning streamers. All gear ground safety locks must be removed before flight.

LANDING GEAR CONTROLS AND INDICATORS.

Landing Gear Handle.

The landing gear handle (figure 1-35) controls the gear, the gear door hydraulic selector valves, which are primary bus powered, and the tail skid actuator, by tertiary bus power. On F-100F airplanes, the handles in each cockpit are mechanically interconnected. When the airplane is airborne, 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 system 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) 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 1-35.) 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 1-35) 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 whenever the audio signal is actuated, or whenever the landing gear and landing gear handle positions do not coincide. On some airplanes, the landing gear warning light comes on whenever the throttle is retarded below 85%, regardless of other conditions, if the landing gear is 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.

Landing Gear Audio Warning Signal.

An audio warning in the headset provides an indication of unsafe landing gear condition when all of the following conditions are met: landing gear not down and locked; altitude below 10,000 feet; airspeed below 205 (± 5) knots IAS; and throttle not in AFTERBURNER (some airplanes*), or throttle retarded below 85% rpm. The warning signal is powered by the primary bus. On some airplanes*, the gear audible warning signal system also operates with the ram-air turbine door open, if the landing gear is up and the airplane is below 10,000 feet, regardless of airspeed.

If a Military Thrust takeoff 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 1-35) is used to disconnect the audible warning 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 resets the signal circuit.

NOSE WHEEL STEERING SYSTEM.

The nose wheel steering system affords directional control of the airplane during taxiing, takeoff, 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 pushbutton 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 1-36.) 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.

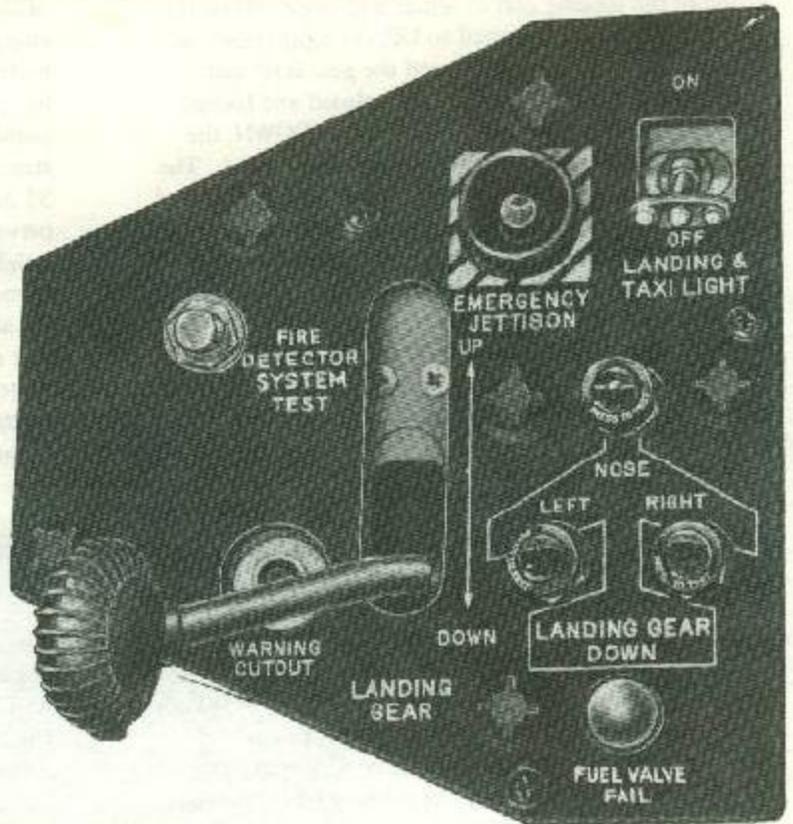
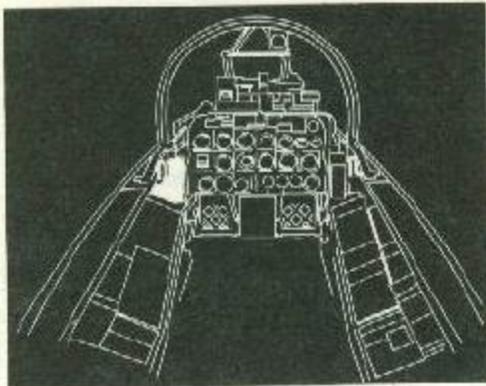
NOSE WHEEL STEERING BUTTON.

The nose wheel steering system is engaged or disengaged by a pushbutton switch. (See figure 1-32.) Momentarily pressing the button energizes the steering shutoff valve

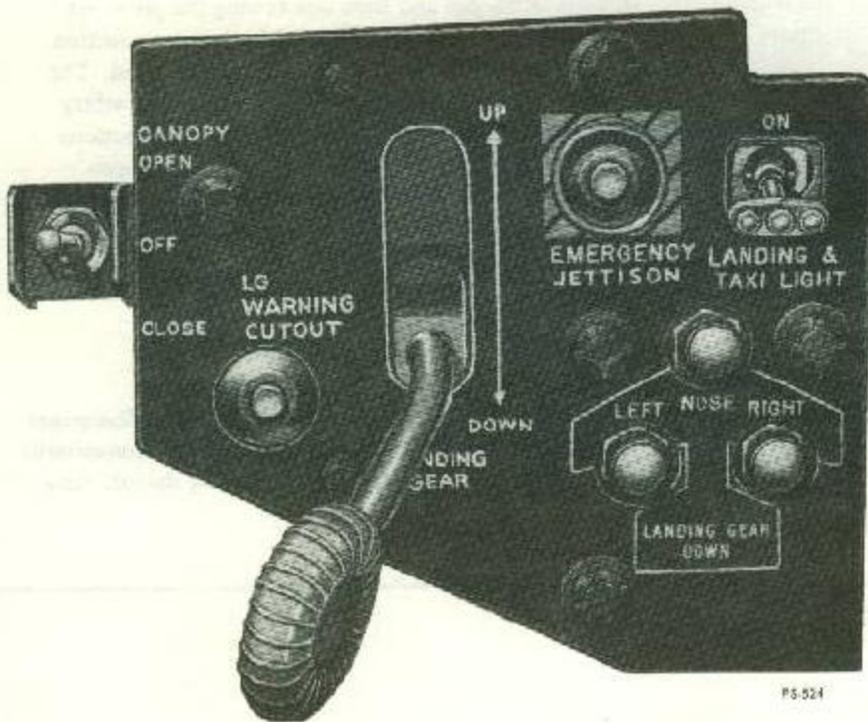
*F-100D-61 and later, and F-100F Airplanes

LANDING GEAR CONTROL PANEL F-100D AND F-100F-2 THROUGH-16

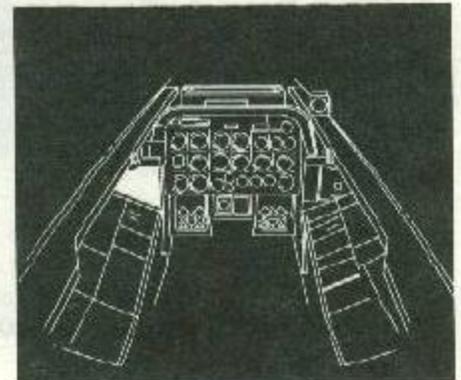
(TYPICAL)



8223-54-13X



P5-524



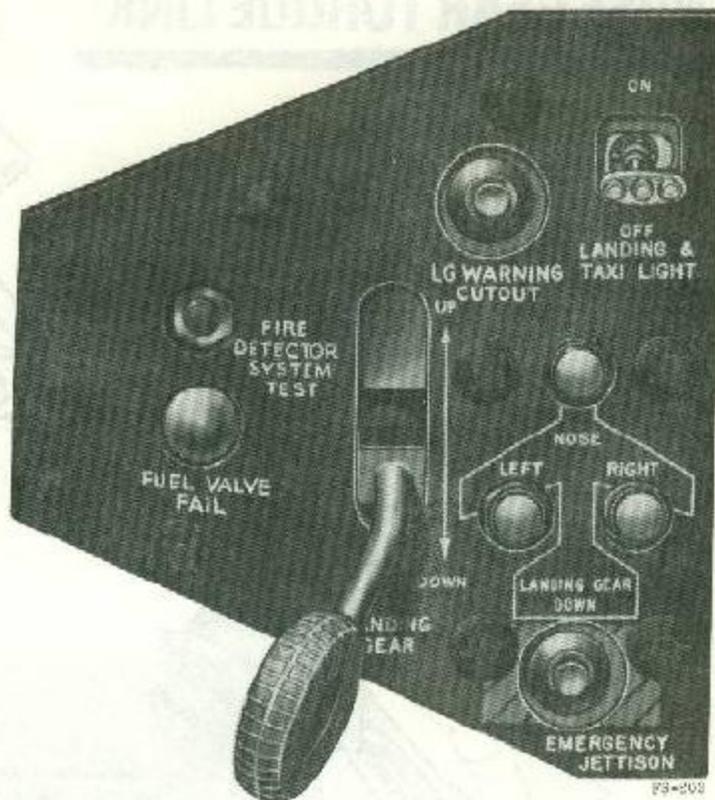
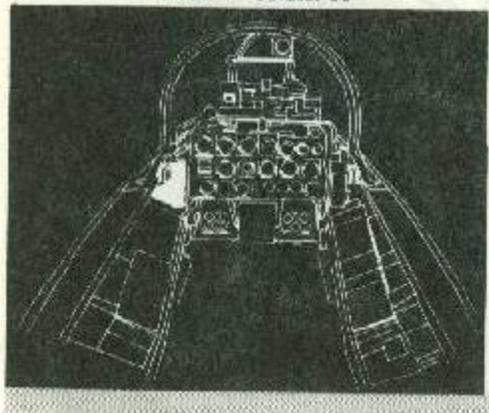
F-100F REAR COCKPIT

100F.1-A33-1A

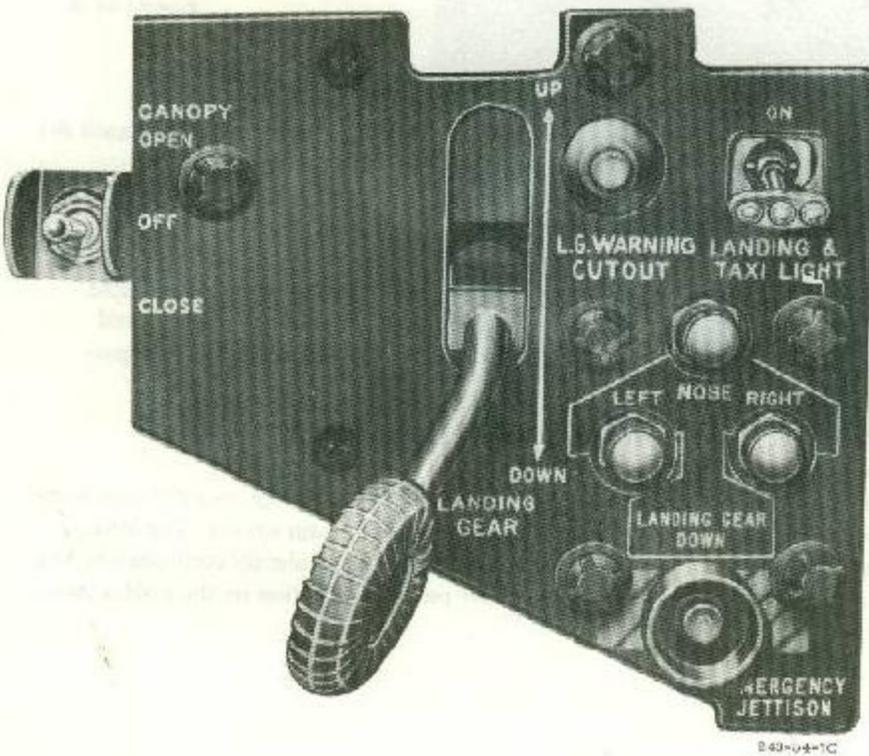
Figure 1-35 (Sheet 1 of 2)

F-100F-20 AIRPLANES

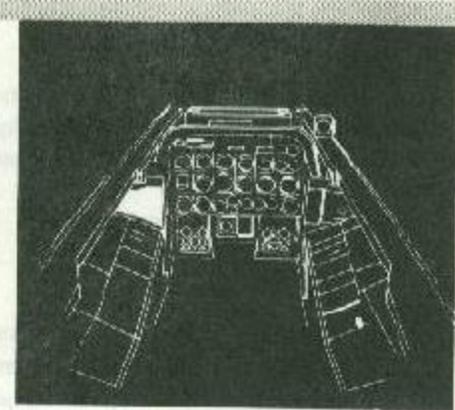
FRONT COCKPIT



89-003



849-04-1C



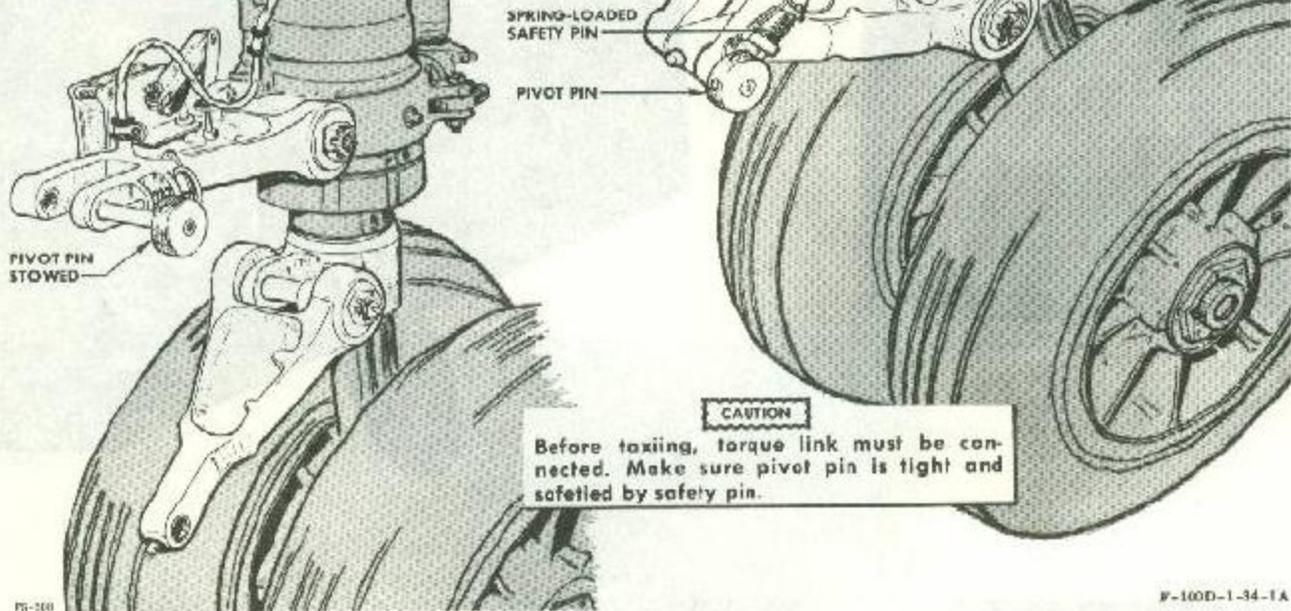
REAR COCKPIT

100F-1-33-1B

Figure 1-35 (Sheet 2 of 2)

NOSE GEAR TORQUE LINK

TORQUE LINK SHOWN DISCONNECTED FOR TOWING



CAUTION
Before taxiing, torque link must be connected. Make sure pivot pin is tight and safetied by safety pin.

F-100D-1-34-1A

Figure 1-36

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.

CAUTION

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 aircraft is on the nose gear.

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 below 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.

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 1-30.) 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 the applied pressure and dumping the fluid for both brakes 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 antiskid system is effective from the highest possible landing speed to a lower limit of about 10 knots. The system should not be depended upon at taxi speeds below 10 knots, because changes in the rate of wheel rotation are not sufficient to provide reliable antiskid control. Touchdown with the wheels locked is prevented by an "arming" circuit that energizes the antiskid control valves when the landing gear handle is UP. The brake system is kept inoperative until the wheels touch down and start to rotate.

Lock-wheel protection is provided for 4 to 16 seconds after initial touchdown so that the brakes will not lock up during a bounce. At touchdown, as the wheels begin to rotate, the skid detector units sense the acceleration and simultaneous wheel rotation and permit brake application within 0.6 second maximum. If either brake is released by the system for a continuous period of 3 seconds, the related control unit turns on an antiskid caution light. If this occurs, the antiskid switch should be turned OFF and normal braking techniques should be used, since antiskid protection cannot be ensured.

Antiskid Switch.

Primary bus power to the antiskid system is controlled by a three-position switch (not in rear cockpit). (See

figure 1-22.) When the switch is ON, antiskid protection is available. In addition, with the switch ON, moving the landing gear handle to UP after takeoff engages the arming circuit that prevents landing with the brakes on. This gives locked-wheel protection for about 4 to 16 seconds after initial touchdown. 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 1-19) 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 (51, figure 1-6; 3, figure 1-7; 1, figure 1-12; 35, figure 1-13) 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 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 takeoff 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.

ARRESTING HOOK RELEASE BUTTON.

The arresting hook release button (21, figures 1-8 and 1-9; 21, figure 1-14; 15, figure 1-17) is powered by the battery bus. The release button has a light in the cap that comes on when the arresting hook is released. Pressing this button actuates the solenoid latch that releases the hook. Once the hook is released, it must be manually cocked by ground personnel. There is a small post light adjacent to the arrestor hook release button guard. This light is controlled by the instrument panel light rheostat for night operations.

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.

The following paragraphs contain information pertaining to basic instrument systems and power requirements. For information on instrument displays, refer to Instrument Flying Manual, AFM 51-37.

PITOT-STATIC BOOM.

Pitot and static pressures for various flight instruments are obtained from the pitot-static boom. (See figures I-1 and I-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 I-6; 18, figure I-7; 11, figure I-12, figure I-13) 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. (Refer to VGH Data Recording System — Airplanes Changed by T.O. 1F-100-1031 in section IV.)

AAU-19/A ALTIMETER.

The AIMS system incorporates a servoed altimeter that functions in conjunction with the AIMS system altitude automatic reporting feature. (See figure I-37.) The servoed altimeter, which replaces the standard altimeter, also functions in the standby mode as a conventional altimeter. In the servoed mode, the altimeter presents aircraft altitude corrected for static system installation error. When the altimeter is functioning in the servoed mode, use of the standard altimeter correction card (on the canopy frame) is not necessary. The altitude indica-

AIMS SYSTEM SERVOED ALTIMETER

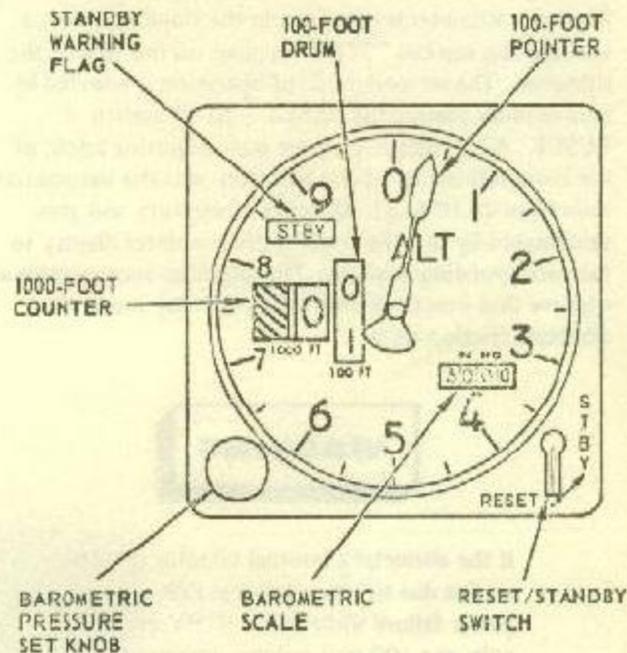


Figure I-37

tion is presented on a counter, drum, and pointer display covering a range of -1000 to +80,000 feet. The counter-drum portion of the display provides a 3-digit indication. The first two digits (counter display) indicate altitude X 1000 feet. The third digit (drum display) indicates altitude X 100 feet. The pointer also indicates altitude X 100 feet with a full revolution equivalent to 1000 feet. The pointer display enables more precise reading because the scale is graduated in increments of 50 feet.

Altitude data is processed by the AIMS system altitude computer and is encoded for transmission in response to mode C interrogations with altitude reported in increments of 100 feet. When functioning in the servoed mode, output

data from the altitude computer is also fed to the altimeter. The switch-over to the standby mode can be selected by a RESET - STBY switch located at the lower right corner of the altimeter or the switch-over will occur automatically in case of power failure or altitude computer malfunction. When the altimeter is operating in the standby mode, a warning flag marked "STBY" appears on the face of the altimeter. The servoed mode of operation is selected by momentarily placing the RESET - STBY switch at RESET. A barometric pressure scale adjusting knob, at the lower left corner of the altimeter, sets the barometric scale from 28.10 to 31.00 inches of mercury and also simultaneously sets the counter-drum-pointer display to the corresponding position. The altimeter incorporates a vibrator that functions only in the standby mode to eliminate friction error.

WARNING

If the altimeter's internal vibrator is inoperative due to either internal failure or dc power failure while in the STBY mode only, the 100-foot pointer may momentarily hang up when passing through "0" (12 o'clock position). If the vibrator has failed, the 100-foot pointer hangup can be minimized by tapping the case of the altimeter. Be especially watchful for this failure when minimum approach altitude lies within the 800- to 1000-foot part of the scale (1800 to 2000 feet, 2800 to 3000 feet, etc.), and use any appropriate altitude backup information available for altitude cross-check; e.g., cockpit pressure altitude indicator.

NOTE

During rapid accelerations or decelerations above 300 KIAS, the vertical velocity indicator will give erroneous indications. The AAU-19/A altimeter in the RESET mode should be used for correct indication of ascent or descent.

Altimeter Correction Card.

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

NOTE

Zero altitude position correction should be used for the AAU-19/A altimeter in the RESET mode.

Airspeed/Mach Indicator.

The airspeed/Mach indicator (46, figures 1-6 and 1-7; 3, figure 1-12; 34, figure 1-13) shows indicated airspeed within a range of 80 to 850 knots.

NOTE

The maximum allowable airspeed/Mach pointer indicates a speed greater than the clean airplane limit airspeed; therefore, it should be ignored.

MAGNETIC COMPASS.

A conventional magnetic compass, suspended from the windshield bow, provides standby heading indications for navigation in case of instrument or electrical system failure. A compass correction card is on the right canopy rail.

ATTITUDE INDICATOR.

An ARU-13A type attitude indicator (9, figures 1-6, 1-7, and 1-12; 5, figure 1-13) as a pictorial-type instrument that displays information from an electrically operated, remote MD-1 gyro control assembly. Power is supplied from the 3-phase ac instrument bus. A window in the lower left corner of the instrument shows "OFF" only with loss of power and not for internal failure. The system starts operating when the engine master switch is ON. The "OFF" will not be covered until after a warmup period

of approximately 1-1/2 to 2-1/2 minutes. "OFF" also will appear in case of failure of 3-phase ac instrument bus power.

WARNING

After airplane maneuvers exceeding 82 degrees climb or dive, attitude indications may not be reliable until the gyro has been re-erected.

- There is no indication for internal failure of the attitude indicator system.

STANDBY ATTITUDE INDICATOR.

The standby attitude indicator, a 2-inch vertical gyro indicator (VGI), is a pictorial-type instrument (44, figure 1-6; 43, figure 1-7) that displays information from an electrically operated remote MD-1 gyro control assembly. Power is supplied from the 3-phase ac instrument bus. Operation of the standby attitude indicator and ARU-13A type attitude indicator is identical.

ATTITUDE INDICATOR FAST ERECTION BUTTON.

The square attitude indicator fast erection pushbutton (11, figures 1-6 and 1-7; 8, figure 1-12; 25, figure 1-13) is marked "PUSH VGI ERECT." The button is powered by the 3-phase ac instrument bus and permits fast erection of the attitude gyros only while the button is depressed. 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. The "OFF" flag may or may not appear during fast erection. If the "OFF" flag remains present after the erection button is released, then it must be assumed the gyro has failed.

- Do not hold the fast erection button in longer than 1-1/2 minutes without a 2-minute cooling period between applications.

TURN-AND-SLIP INDICATOR.

A conventional (4-minute) turn-and-slip indicator (10, figure 1-6; 16, figure 1-7; 36, figure 1-12; 7, figure 1-13) is electrically driven by the primary bus. Because of the mounting tilt of the turn-slip indicator, the indicator will show a turn in the opposite direction to that of actual aircraft attitude during a high rate of roll. Refer to Instrument Flight Procedures in section IX.

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, and warning light bulbs (except the fuel system shutoff valve fail light, plus those in the engine compartment fire- and overheat-warning lights) are included in this test circuit which is powered by the primary bus. In addition, the status display lights may be tested provided the main ac bus is energized.

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 1-29 and 4-15) 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 1-29 and 4-15.) 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 1-19), powered by the primary bus, comes on whenever any of the placard type caution lights comes 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.

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 compart-

ment. One of four different configurations, which can be identified by the system test buttons, may be installed. Most reworked airplanes and airplanes changed by T.O. 1F-100-965 have a single-wire system connected to single-terminal detectors with a single pushbutton switch for testing circuits. Airplanes with a dual-wire system connected to dual-terminal detectors have four pushbutton switches for testing the circuits. Airplanes with a dual-wire system connected to single terminal detectors have two pushbutton switches for testing the circuits. Some airplanes have a single-wire system connected to single-terminal detectors. These airplanes have two combination pushbutton 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 1-19.) 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 1-35.) 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

*F-100F Airplanes

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" pushbuttons 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. Some airplanes use combination pushbutton 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 1-38) 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.

CANOPY SEAL.

An inflatable rubber seal (figure 1-38) 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.

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

A windscreen (figure 1-38) 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 or fails, pulling the windscreen manual emergency release knob will raise the windscreen and afford the rear seat occupant some protection. 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.

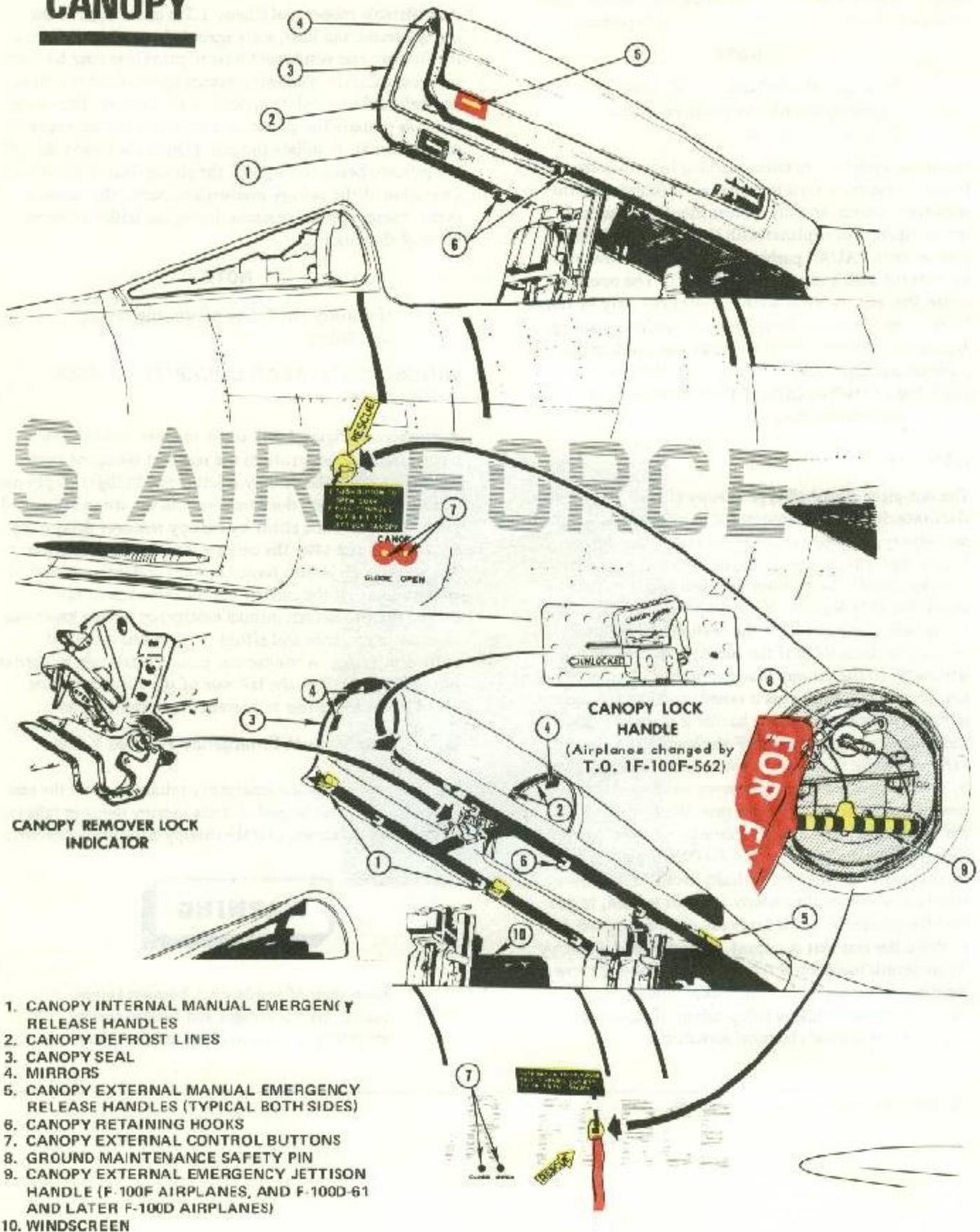
The windscreen manual emergency release knob in the rear cockpit only, must be pulled if the canopy remover fails to release the windscreen, or if the canopy is manually released.

WARNING

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

*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 HOOKS
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 1-38

CANOPY CONTROLS AND INDICATOR.

NOTE

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

Canopy External Control Buttons.

Two pushbuttons (figure 1-38), on each side of the airplane, marked "OPEN" and "CLOSE," control electrical power to 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, figures 1-8 and 1-9; 18, figure 1-14) controls canopy operation from the cockpit. 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 1-38) 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 Alternate Emergency Jettison Handle.

A canopy alternate emergency jettison handle (26, figure 1-10; 27, figure 1-11; 27, figure 1-15; 20, figure 1-18) 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 3-5.) When this handle is pulled to its full extended position (about 1 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.

Canopy Internal Manual Emergency Release Handle.

The canopy internal manual emergency release handle right side only (figure 1-38) 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.

*F-100F-2 Airplanes AF56-3726 and -3727; F-100F-11 and later airplanes; and F-100F Airplanes changed by T.O. 1F-100F-562

†F-100F Airplanes

Canopy External Manual Emergency Release Handles.

Two canopy external manual emergency release handles (figure 1-38), 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 1-38), 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.*

The canopy remover lock (figure 1-38) is marked "OPEN" and "CLOSED." In the initial phase of the canopy jettison operation, the head of the canopy remover, in its upward travel, strikes the forward "OPEN" portion of the canopy remover lock. This causes the lock to rotate and lock the remover to the canopy. The "OPEN" portion should be exposed so that the canopy remover will be locked to the canopy during canopy jettison. If the aft "CLOSED" portion of the lock is exposed, the canopy remover will not be retained by the lock during canopy jettison, but

will be left in the cockpit to possibly endanger the rear cockpit occupant.

Canopy-Not Locked Warning Light.

A placard-type canopy-not-locked warning light (figure 1-19) 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 practical after the canopy-not-locked light comes on.

EJECTION SEAT.

WARNING

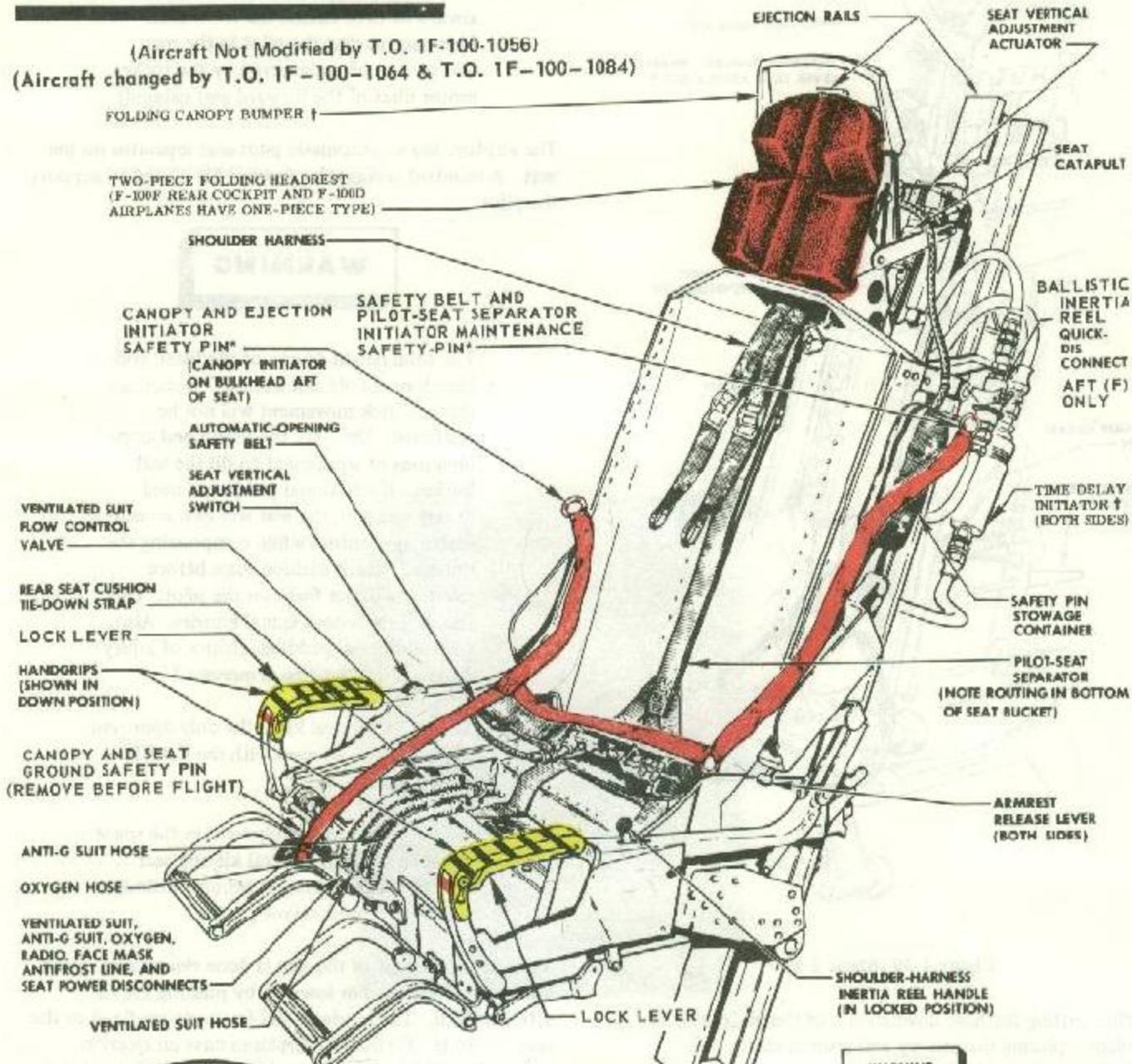
On aircraft changed by T.O. 1F-100-1064, inspect the red stripe on the forward face of both handles and guards for alignment. If the red stripes are not in alignment, the ejection seat is unsafe for flight.

The ejection seat (figure 1-39) 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. On aircraft modified by T.O. 1F-100-1064, the quick disconnect has been removed. Therefore, the seat should be rendered inoperative during emergency rescue by

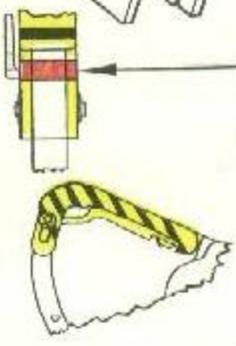
*F-100F-1 Airplanes AF56-3726 and -3727, and F-100F-11 and later airplanes

EJECTION SEAT (TYPICAL)

(Aircraft Not Modified by T.O. 1F-100-1056)
 (Aircraft changed by T.O. 1F-100-1064 & T.O. 1F-100-1084)



HANDGRIP-
 LOCK LEVER -
 SQUEEZED
 BEFORE
 UPWARD &
 AFT MOVEMENT.



WARNING

ASSURE RED STRIPE IS IN LINE BEFORE PREFLIGHT.

*Check removal before flight.
 † F-100F Front cockpit only

Figure 1-39 (Sheet 1 of 3)

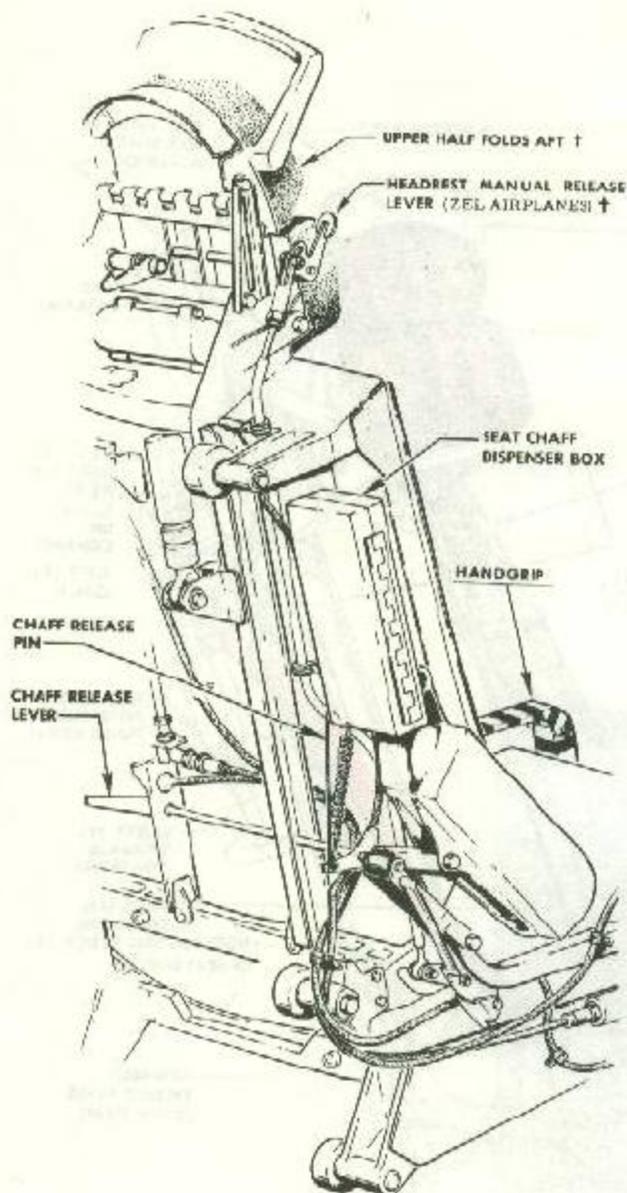


Figure 1-39 (Sheet 2 of 3)

either cutting the hose downstream of the M-26 initiator and/or replacing the canopy and ground safety pin. (Reference figure 1-39.)

NOTE

On F-100F airplanes changed by T.O. 1F-100-1056, because of the

tandem location of the pilots' seats, a 1-second time-delay system sequences the seat ejection 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. A standard rectangular survival kit is used to support the pilot.

WARNING

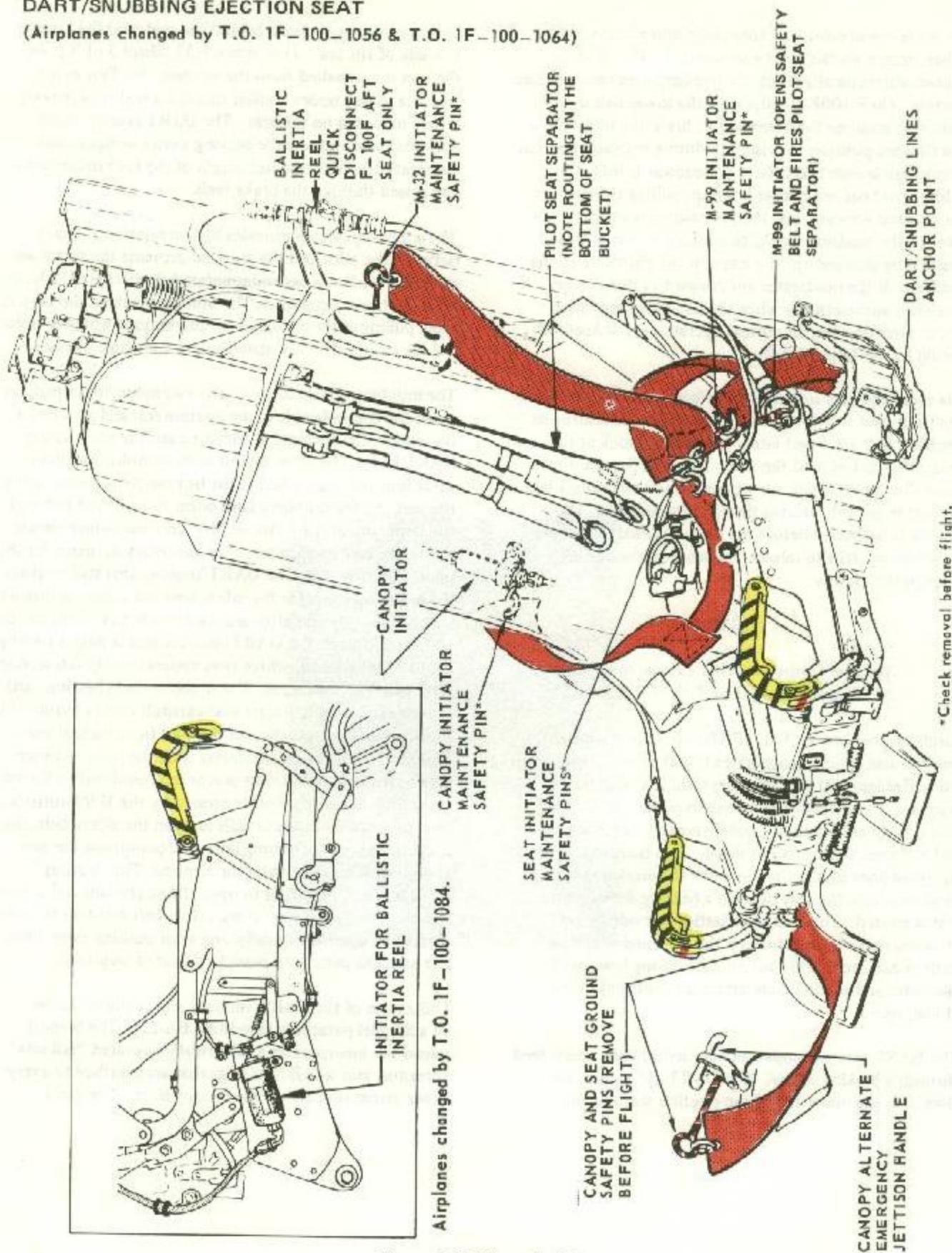
The total height of any of the listed combinations should not exceed 7 inches, so that aft stick movement will not be restricted. Use only the prescribed combinations of equipment to fill the seat bucket. If additional padding is used during ejection, the seat will gain considerable momentum while compressing 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.

- The MD-1 survival kit is the only approved survival kit to be used with the DART/ Snubber seat.
- 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 takeoffs. For all normal operations, the headrest should be flat (not folded). On F-100F-2 through F-100F-16 airplanes, the top half of the headrest on the front seat folds back to provide better visibility

DART/SNUBBING EJECTION SEAT

(Airplanes changed by T.O. 1F-100-1056 & T.O. 1F-100-1064)



Airplanes changed by T.O. 1F-100-1084.

Figure 1-39 (Sheet 3 of 3)

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. On F-100F-20 airplanes, the lower half of the front seat headrest folds forward to brace the pilot's head in a forward position for visibility during high-acceleration zero-length launch takeoffs. The headrest is folded by holding the headrest release lever up, pulling the sides of the headrest forward, and then releasing the lever. After takeoff, the headrest should be released to the normal position by pushing up on a lever on the right side of the headrest. If the headrest is not released in this manner, it releases automatically when the handgrips are raised before ejection. For all normal operations, the headrest should be flat (not folded).

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.

NOTE

The chaff dispenser box has been removed on airplanes changed by T.O. 1F-100-1072.

Airplanes changed by T.O. 1F-100-1056 have a modified ejection seat which incorporates DART (Directional Automatic Realignment of Trajectory) and seat snubbing systems. The DART feature improves the ejection seat function by automatically stabilizing the seat in the pitch and roll axes, during rocket firing. This is accomplished by nylon lines that are anchored to the airplane and deployed from the seat through a braking device as the seat is ejected. This seat stabilization provides more effective rocket thrust to keep the pilot and seat on a path of maximum trajectory height during low speed ejections, and adequate tail clearance during ejection at high speed.

The DART system consists of four nylon lines which feed through a braking device. The DART nylon lines are stowed at the underside of the ejection seat and are

anchored to the airframe behind the seat near the lower left side of the seat. (See figure 1-39, Sheet 3 of 3.) As the seat is catapulted from the airplane, the four nylon lines are pulled under tension through a reel-type braking device mounted on the seat. The DART system senses seat pitch and roll and the braking device compensates automatically until the full length of the four nylon lines has passed through the brake reels.

The snubbing system provides high separation velocity between the pilot and the seat and prevents the seat from striking the pilot or becoming entangled with the parachute after pilot/seat separation. The snubbing feature also insures rapid pulling of the parachute arming lanyard which is essential for a successful low speed and low altitude ejection.

The snubbing system incorporates two nylon lines which are stowed at the underside of the ejection seat and attached at one end to the airframe at the same anchor point as the DART lines. The other end of each snubbing line has a shear link and is attached at the bottom rear of each side of the seat. As the snubbing lines begin to reach the point of full deployment, they fire an M-99 initiator which causes the safety belt to open and fires the rotary actuator for the pilot/seat separator. The DART/snubber seat still employs the M-32 initiator (for the safety belt and rotary actuator) which fires 1 second after seat ejection begins; however, the M-32 function on the DART/snubber seat is only a backup to the M-99 initiator which fires approximately 0.6 second after seat ejection begins. The snubbing lines become taut (which occurs shortly after seat catapult rocket burnout) to provide positive separation of the pilot from the seat and to prevent the seat from interfering with the pilot and parachute after separation. The seat is fully snubbed to the airplane after the safety belt is opened by the M-99 initiator. In case the M-99 initiator fails to open the safety belt, the shear links in the snubbing lines fail, permitting the seat and pilot to separate from the airplane. The "backup" M-32 initiator then fires to open the safety belt and actuate the pilot/seat separator. If the safety belt still fails to open, it must be opened manually and after pushing away from the seat, the parachute must be actuated manually.

Utilization of the DART/snubber seat requires the use of a Stencel parachute (modified BA-22). The Stencel parachute incorporates a ballistically-operated "fail safe" spreading gun which fires slugs that are attached to every other suspension line at the canopy skirt. The gun is

fired by a lanyard when a certain amount of tension is imposed on the suspension lines as the parachute deploys. This causes the parachute canopy to be spread symmetrically and rapidly.

The symmetrical spreading of the canopy distributes the airloads equally which prevents stress concentration on individual lines or panels.

WARNING

Due to the symmetrical and rapid spreading of the canopy, the opening shock forces exerted on the pilot are increased considerably; therefore, the leg straps of the parachute harness must be adjusted to a snug fit.

If the spreading gun does not fire, the slugs are released and the parachute canopy inflates aerodynamically in the usual manner. The Stencil parachute also utilizes low speed and high speed external pilot chutes. These external pilot chutes assist the internal pilot chute in pulling the canopy from the pack and reduce the time from release of the internal pilot chute to firing of the "fail safe" spreading gun. The low speed external pilot chute is designed to break away at speeds in excess of 190 knots. When this occurs, the high speed external pilot chute is deployed.

The zero-delay lanyard hook to the parachute ripcord handle is not utilized on the Stencil parachute. The Stencil parachute incorporates a 3/4-second timer to delay chute opening after the arming lanyard is pulled instead of the 1-second delay timer that is used on the unmodified BA-22 parachute.

Because of the relationship of the seat trajectory with the pilot trajectory after separation using the DART/snubber system compared to the trajectories without DART/snubbing, the Stencil parachute must be used with the DART configuration but **MUST NOT** be used with airplanes that do not have the DART configuration.

WARNING

Use of incorrect parachute for the ejection seat configuration may result in seat/parachute entanglement during 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. On F-100F-20 airplanes, the shoulder harness has a multidirectional type reel which automatically locks the shoulder harness by the speed the harness is pulled from the reel or when the reel is subjected to a side acceleration exceeding 2G. The inertia reel is locked automatically when either ejection seat handgrip is raised during the seat ejection sequence.

Airplanes changed by T.O. 1F-100-1084 have incorporated a Ballistic Powered Inertia Reel (BPIR). The BPIR automatically retracts when either ejection seat handgrip is raised at the start of the seat ejection sequence. The quick-disconnect on the F-100F aft seat is incorporated to allow seat/aircraft separation. If the quick-disconnect is not properly engaged, a red ring should be visible at the separation point.

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 the safety belt initiator. When the safety belt initiator fires, gas pressure is provided to both the safety 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.

Ejection is initiated by squeezing the locking lever on either handgrips inward and raising the leg guards. The handgrips are latched in the down position by the locking lever which is engaged into horizontal slots on the guard and down lock lugs. Squeezing the locking lever inward toward the center line of the airplane releases the handgrips for the upward and aft movement necessary to jettison the canopy and initiate the ejection. 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. Raising either handgrip to full up 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 and to an M-26, 0.3-second delay initiator. This gas pressure pulls the seat pin from the canopy remover, causing the remover to fire and jettison the canopy and fire the M-26 initiator. The gas pressure generated by the M-26 initiator is directed 0.3 seconds later into the ejection seat catapult. When either or both ejection seat handgrips are raised the shoulder harness is automatically locked and on aircraft changed by T.O. 1F-100-1084, the shoulder harness is automatically retracted placing the pilot into the optimum position for ejection. In addition, the front seat folding canopy bumper on the F-100F airplanes is automatically raised into position by spring action. A pull of approximately 30 pounds is required to raise either handgrip.

On F-100F airplanes, ejection of the front and rear seats is normally controlled by their respective handgrips (airplanes changed by T.O. 1F-100-1064). 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 raising either front seat handgrip

will eject the rear seat first, followed 1/2 to 1 second later by the front seat. The front seat time delay is 1/2 second on airplanes not changed by T.O. 1F-100-1056 and 1 second in airplanes changed by T.O. 1F-100-1056.

Seat Vertical Adjustment Switch.

The seat is vertically adjusted by primary bus power through a three-position switch (figure 1-39) which is spring-loaded to OFF (center). The seat may be stopped at the desired position by releasing the switch.

CAUTION

Caution should be exercised to prevent continued operation of the switch in the DOWN position after the seat reaches the FULL DOWN position. In order to remove any possible strain, it is recommended that the switch be returned to the UP position momentarily to assure that the catapult mechanism is not in a prestressed position.

NOTE

On airplanes changed by T.O. 1F-100-1103, an electrical down travel limit switch has been added to provide clearance for the DART/snubber.

Shoulder Harness Inertia Reel Handle.

On airplanes changed by T.O. 1F-100-1084, F-100F rear seat only, check the quick disconnect to insure that the red stripe is NOT visible.

The shoulder harness inertia reel is manually controlled by a handle. (See figure 1-39.) 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 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.

HBU AUTOMATIC-OPENING SAFETY BELT - AIRCRAFT CHANGED BY T.O. 1F-100-1072.

The HBU belt has been thoroughly tested and proven to eliminate the occurrence of inadvertent lap belt opening or binding of the automatic release. Manual release of the lap belt is accomplished by rotation of the rotary mechanism on the belt. Automatic operation is accomplished during ejection by gas pressure from a separate automatically controlled initiator. A description of the hook-up,

use, and operation of the HBU lap belt when used in conjunction with the automatic parachute is as follows:

1. Manual Operation: Refer to figure 1-40, for proper sequence of opening and closing the HBU lap belt, shoulder harness, automatic parachute arming lanyard anchor (Gold Key).

2. Automatic Operation: Automatic lap belt opening and man/seat separation are accomplished as part of the seat ejection sequence and requires no additional effort on the part of the pilot.

WARNING

Under no circumstances should the belt be manually opened before ejection regardless of altitude.

3. Within 1 second after seat ejection begins, an automatically-fired initiator causes the safety belt to open (releasing the shoulder harness) and fires the rotary actuator for the pilot/seat separator. The automatic arming lanyard (Gold Key) is retained by the left half of the safety belt and actuates the automatic parachute as the pilot separates from the seat.

LOW-ALTITUDE ESCAPE EQUIPMENT.

Low-altitude escape capability is provided on airplanes without the DART/snubber seat (i.e., airplanes not changed by T.O. 1F-100-1056), by means of an M-32 initiator and use of a zero-delay parachute arming lanyard hook. The M-32 initiator fires 1 second after seat ejection begins in order to open the safety belt and fire the pilot/seat separator actuator. Zero-delay deployment of the parachute is accomplished by use of a lanyard which is fastened to the parachute arming lanyard and has a detachable hook that can be attached to the parachute ripcord handle. At low altitude, the zero-delay hook must be connected to the parachute ripcord handle, to automatically deploy the parachute immediately after separation from the ejection seat. At higher altitudes, the hook must be disconnected from the parachute ripcord handle, thus allowing the parachute aneroid and 1-second

timer to delay parachute deployment until below 14,000 feet and to reduce opening shock at high speed. A ring, attached to the parachute harness, is provided to stow the zero-delay hook when the hook is not connected to the ripcord handle.

Improved low altitude escape capability is provided on airplanes with the DART/snubber seat (i.e., airplanes changed by T.O. 1F-100-1056) by means of nylon stabilization and snubbing lines, an M-99 initiator (with the 1-second delay M-32 initiator retained as a backup) to open the safety belt and fire the pilot/seat separator actuator, and use of a Stencel parachute. Refer to Ejection Seat in this section for detailed information concerning the Stencel parachute. Although the parachute automatic arming

lanyard anchor is inserted in the notch at the top of the HBU safety belt, the zero-delay lanyard hook to the parachute ripcord handle is not utilized on the Stencel parachute. This eliminates the need to manually attach or disconnect the lanyard hook to the ripcord handle during various phases of flight.

Refer to Ejection in section III for emergency minimum ejection conditions and zero-delay lanyard connection requirements.

AUXILIARY EQUIPMENT.

Information concerning auxiliary equipment is supplied in section IV.

AUTOMATIC-OPENING SAFETY BELT, TYPE HBU

(Aircraft changed by T.O. 1F-100-1072)

LOCKED

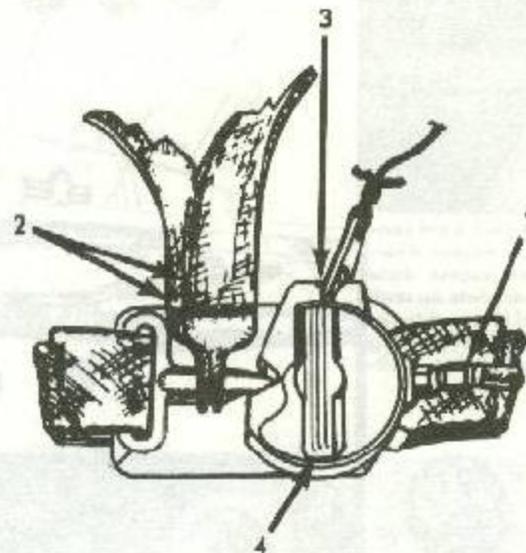
1. Initiator hose to automatic release mechanism.
2. Shoulder harness loops over link.
3. Anchor (from automatic parachute arming lanyard) inserted in notch at top of buckle.

4. Manual release handle is closed.

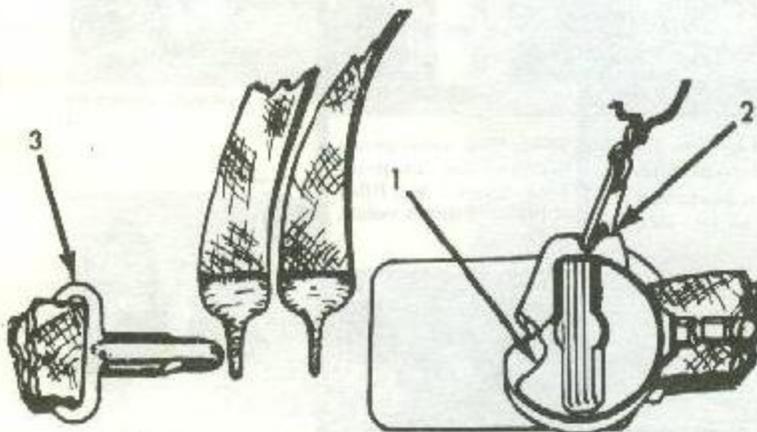
WARNING

Lap belt cannot be fastened until zero delay lanyard anchor is properly inserted into slot at top of buckle. After lap belt is fastened perform a pull check of the arming lanyard to insure that the Gold Key is secured.

- Lanyard must be outside parachute harness and not fouled on any equipment, to permit clean separation from seat.
- To ensure a positive lock of link and anchor into lap belt buckle mechanism, do not rotate manual release handle while fastening lap belt.
- When tightening the lap belt, assure that belt webbing is under stress and not the ballistic hose. Compensate as necessary by adjusting the webbing on the link half of the belt to relieve tension on the ballistic hose.



AUTOMATICALLY OPENED



1. Automatic release mechanism actuated by gas pressure from initiator, detaching link from lap belt buckle mechanism.
2. Anchor (from automatic parachute arming lanyard) retained by buckle mechanism.
3. Link released.

MANUALLY OPENED

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

WARNING

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

3. Manual release rotated to open position.

NOTE

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

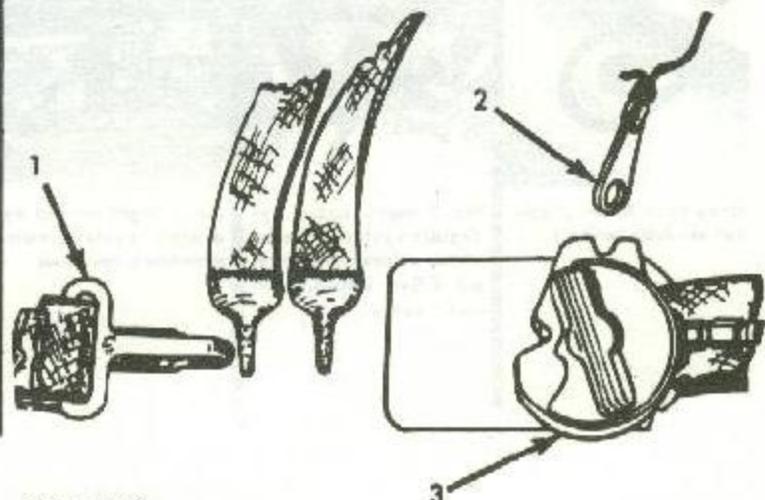
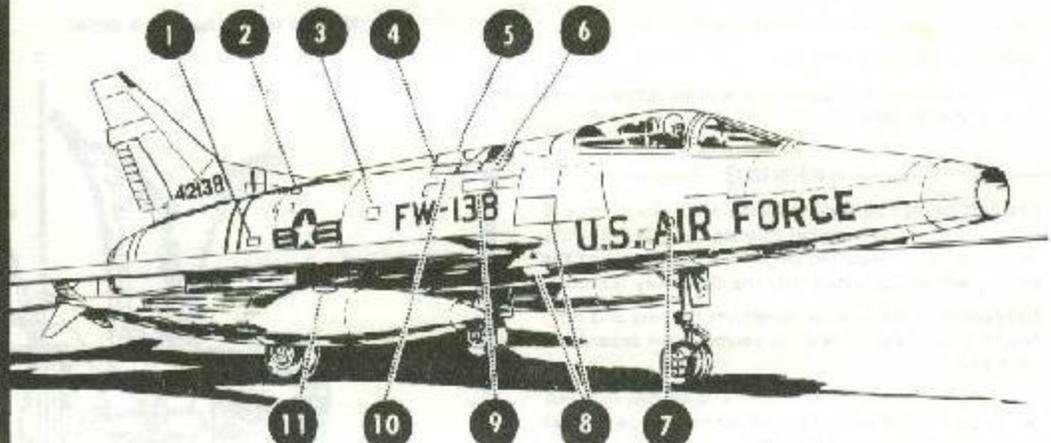


Figure 1-40

SERVICING DIAGRAM (TYPICAL)



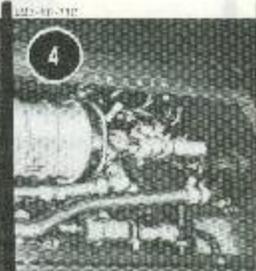
1
Aft tank fuel level control valve access door. (Remove access door and cover plate on tank to refuel internal tanks if single-point refueling equipment is not available.)



2
AC generator constant-speed drive unit oil tank filler.



3
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.)



4
Typical for No. 1 flight control hydraulic system compensating reservoir on left side.



5
Wing flap emergency accumulator air pressure gage, air filler valve, and dump valve.



6
Utility hydraulic reservoir



11
Drop tank filler. (Typical all drop tanks.)



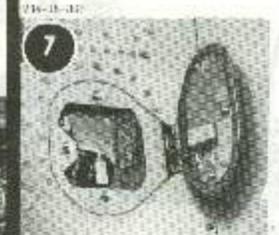
10
No. 2 flight control hydraulic system accumulator air pressure gage, air filler valve, and dump valve.



9
No. 2 flight control hydraulic system compensating reservoir.



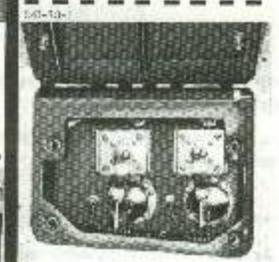
8
Hydraulic system ground-test connections. (F-100D and F-100F-2 through-16)



7
Liquid oxygen filler valve. (F-100D)



* (F-100F-20)



(F-100F)

RIGHT SIDE

Figure 1-41 (Sheet 1 of 3)

SPECIFICATION

FUEL JP-4 (MIL-J-5624)
 OIL MIL-L-7808
 HYDRAULIC FLUID MIL-H-5606
 LIQUID OXYGEN MIL-O-27210

NOTE

For alternate and emergency fuels, refer to "Fuel Grade Properties and Limits" in Section VII.
 When using alternate or emergency fuels, refer to "Alternate and Emergency Fuel Limitations" in Section V and "Operation on Alternate or Emergency Fuel" in Section VII.

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

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

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

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

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

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

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

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

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

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

6 Single-point refueling receptacle. (F-100D and F-100F-2 through-16)

5 Engine oil tank filler.

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

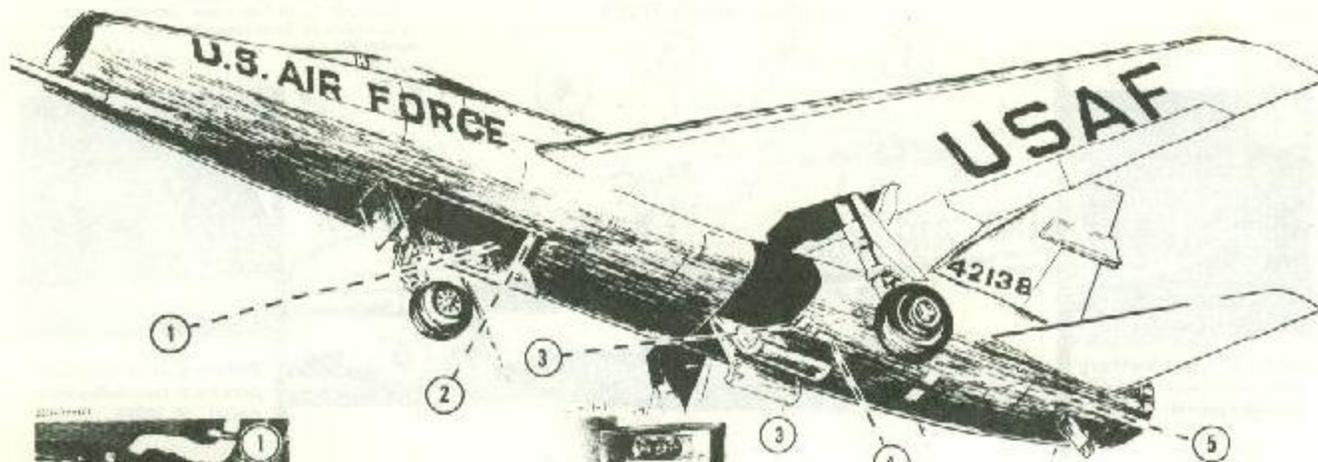
LEFT SIDE

(F-100F-20)

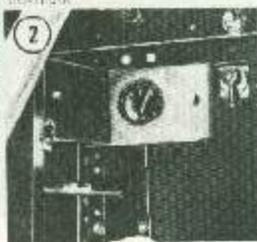
Figure 1-41 (Sheet 2 of 3)

11D-XX-100

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.)



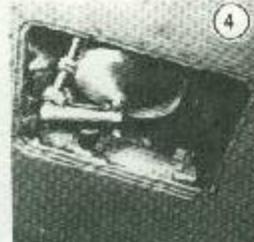
Nose gear emergency lowering accumulator air pressure gage, air filler valve, and dump valve.



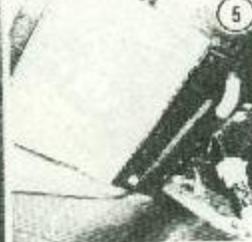
External power receptacles for starter air supply and ac and dc electrical power.

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)

TEMPERATURE (°F)	PLACARDED ACCUMULATOR PRECHARGE														
	-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 (±30)	1072	1094	1114	1135	1155
NOSE GEAR EMERGENCY LOWERING ACCUMULATOR	990	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	329	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

Figure 1-41 (Sheet 3 of 3)

NORMAL PROCEDURES



FIGURE 1-1

section

II

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INTRODUCTION.

CODING.

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

- F-100D Airplanes
- F-100F Airplanes
- F-100F front cockpit only

PREPARATION FOR FLIGHT.

FLIGHT RESTRICTIONS.

Refer to section V for detailed airplane and engine limitations.

FLIGHT PLANNING.

Refer to T.O. 1F-100C(I)-1-1.

TAKEOFF AND LANDING DATA CARDS.

Refer to T.O. 1F-100C(I)-1-1.

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 takeoff 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 iv for additional information on this subject. Refer to applicable Air Force regulations concerning use of checklist.

ENTRANCE.

The cockpit can be entered from either side. 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 – GROUND ALERT COCKING.

Operational requirement may dictate the airplane be placed "cocked" in a short-reaction ground alert posture for a conventional nuclear, or air defense mission. When "cocking" an airplane, all preflight inspection items and airplane system checks, including "Before Taxiing," should be performed unless the airplane has just returned from a mission and the pilot cocking the airplane is assured all systems are operational. Wing flaps should be in the up position before engine shutdown to allow access to the single-point refueling receptacle. After the engine has been shut down, the procedure under "Cockpit Check (All Flights)" should be reaccomplished; repositioning the switches necessary to "cock" the airplane in a short-reaction status. Refer to "Scramble/Launch From Cocked Posture" in this section.

BEFORE EXTERIOR INSPECTION.

1. Form 781 – Check.
2. AWRS programmer – Check. Make sure that the AWRS programmer is installed or that the programmer bypass adapter has been connected.
3. All electrical power – Check OFF.
4. Pylon loading selector switches – Check. Make sure pylon loading selector switches are at the correct position for the particular external load configurations.

WARNING

Do not change setting of pylon loading selector switches, because loads may release when switches are reset. If selector switch setting does not correspond to the load on the respective station, maintenance personnel must make a check of applicable electrical circuits before the selector switches are repositioned.

5. Armament switches – OFF or SAFE.
6. Station selector switches* – SAFE.
7. Circuit breakers – In. All circuit breakers in unless otherwise directed.
8. Oxygen quantity – Check.
9. Map case – Check. Make sure necessary publications are in airplane.

When weapons are loaded, refer to appropriate Weapon Delivery Manuals for additional information.

*Some airplanes

EJECTION SEAT AND CANOPY CHECK.

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

1. Parachute – Check correct type for ejection seat. BA-22 parachute shall be used with airplanes that do not have the DART seat (airplanes not changed by T.O. 1F-100-1056). The Stencel parachute shall be used with airplanes with the DART seat (airplanes changed by T.O. 1F-100-1056).

WARNING

Seat/parachute entanglement may occur during ejection if incorrect parachute is used with the ejection seat.

2. Handgrips – Check. Both seat handgrips must be full down and latched, and red stripes aligned.

3. Pilot-seat separator – Check. Check that webbing is properly routed.

4. 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. Make sure all maintenance safety pins are removed.

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.

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

6. Ballistic-powered inertial reel quick-disconnect – Pull-check. Apply a slight downward pull to the lower 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.)

7. Canopy remover lock – Check OPEN.

8. Canopy external emergency release handles – Check closed and latched.

EXTERIOR INSPECTION.

Perform exterior inspection as outlined in figure 2-1. Refer to appropriate Weapon Delivery Manuals for additional procedures applicable to the stores loaded.

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.

 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. UHF Radio – OFF.

4. Throttle – OFF (inboard).

5. Wing flap emergency switch – NORMAL.

6. Fuel regulator selector switch – NORM.

7. Air start switch – OFF.

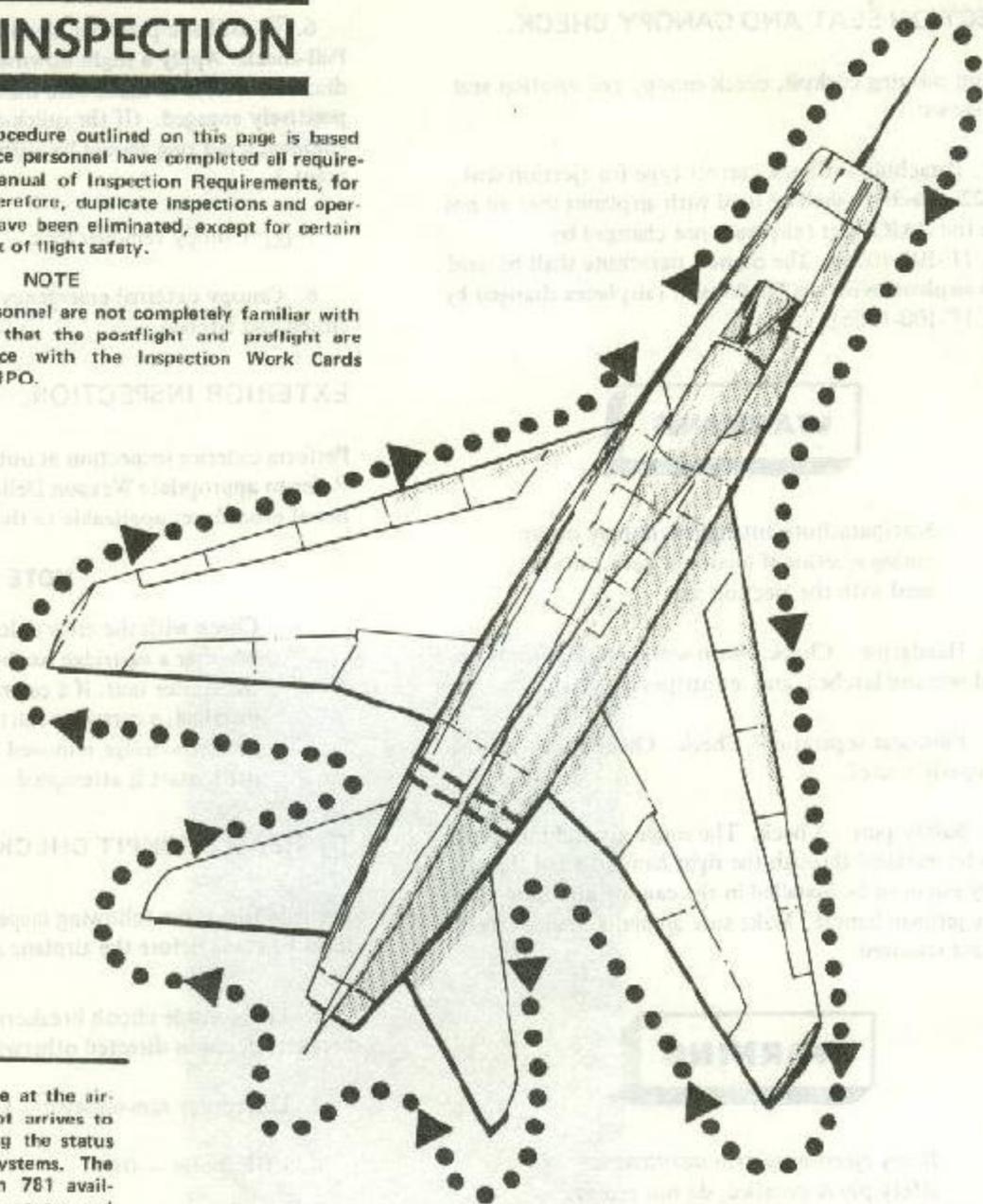
8. Engine master switch – Safetied ON.

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 Inspection Work Cards 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.

NOTE

Drag chute latch handle must not be bent; handle doors, and release plunger should be flush with bottom of fuselage.

AIRPLANE SAFETY CHECKS

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, latch handle flush and not bent, and maintenance safety pin removed.
5. Tires - Check for general condition.
6. External loads - Mounted securely, and safety pins installed.

CAUTION

Do not store miscellaneous items of clothing or equipment in the forward electronic compartment, as electronic equipment can be damaged. Items of clothing or equipment placed in the aft electronic equipment bay can become lodged in the flight control system.

Figure 2-1

9. Fuel system shutoff switch – Safetied ON.
10. Left console airflow knob* – DECREASE.
11. Landing gear handle – DOWN.
12. Landing and taxi light switch – OFF.
13. Drag chute handle – IN (stowed).
14. AC generator switch – Safetied ON.
15. DC generator switch – Safetied ON.
16. Battery switch – Safetied ON.
17. Standby instrument inverter switch – Safetied OFF.
18. Oxygen – NORMAL.
19. Right console airflow knob* – DECREASE.
20. Intercom volume control – Full volume.
21. Cockpit lights – OFF.
22. Radio compass controls – COMP., full volume.
23. Bleed-air emergency switch – NORM.*
24. Right console circuit breakers – Check. All circuit breakers in unless directed otherwise.
25. All loose items – Secured. Secure personal equipment leads, safety belt, and shoulder harness. The safety belt is to be snug over the survival kit. Thread the free end of the survival kit retaining strap down through the right foot brace, across the cockpit floor, and up through the left foot brace. Wrap the strap around the safety belt, with one turn on the left and one turn on the right side of the shoulder harness. Thread the free end of the strap through the strap buckle and pull the strap snug.

NOTE

Place the buckle end of the strap to the right of the shoulder harness to prevent streamer contact with the throttle.

Stow the retainer strap in the right-hand seat storage container.

COCKPIT CHECK (ALL FLIGHTS).**General.**

1. Wheel brake emergency hydraulic pump operation – Check. Pump brake pedals one at a time to determine whether electrically driven pump is 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.
2. Personal equipment – Connected. Survival equipment, ventilated suit, anti-G suit and oxygen/radio leads. Route airplane anti-G suit hose under the leg and ensure it does not interfere with armrest handle. Route all personal equipment leads under safety belt.
3. 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.

- Check that loose ends of shoulder harness are tucked under webbing, and other loose ends are secured, to avert entanglement during ejection.

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.

*Some airplanes

4. Zero-delay lanyard hook* – Attach to parachute ripcord handle. Utilize zero-delay lanyard for all takeoffs and landings unless Stencel parachute is used.

Left Side.

1. Speed brake emergency dump lever – OFF (aft).
2. Emergency ram-air lever* – CLOSED.
3. Wing flap handle – UP (INTERMEDIATE for cocking).
4. Wing flap emergency switch – NORMAL.
5. Throttle – OFF (inboard).
6. Speed brake switch – OFF (center).
7. UHF control switch – OFF.
8. Ground fire switch – SAFE (safetied).
9. Antiskid switch – OFF.
10. Fuel regulator switch – NORM.
11. Drop tank fuel selector switch – As required.

WARNING

Refer to "Drop Tank Fuel Sequencing Limitations" in section V.

12. Air refueling switch – OFF.
13. G-limiter switch – ON (safetied).
14. Air start switch – OFF.
15. Engine master switch – ON.
16. Fuel system shutoff switch – Safetied ON.
17. Landing gear handle – DOWN.

18. Landing and taxi light switch – OFF.

Front.

1. A-4 sight mechanical caging lever – CAGED.
2. Trigger safety switch – CAMERA.
3. Gun-missile switch – SAFE.
4. Clock – set and running; test stop watch.
5. External load emergency jettison handle – IN (clip on).
6. Special store unlock handle – IN.
7. Foot warmer* – As desired.

Right Side.

1. AC generator switch – ON (rear – safetied ON).
2. DC generator switch – ON (rear – safetied ON).
3. Standby instrument inverter switch – OFF (rear – safetied OFF).
4. Interphone – As desired. Set the interphone control panel switches as desired.
5. NAV aids – OFF (as desired for cocking).
6. IFF – STDBY (NORM for cocking).
7. AIMS controls – As required.
8. J-4 directional indicator function selector switch – MAG.
9. Pitot heat – ON. On F-100F-20 airplanes, the pitot heat should not be turned ON if extended ground operation is required.
10. Engine guide vane anti-ice switch – AUTO.
11. Windshield exterior air switch – OFF.

*Some airplanes

12. Cockpit pressures selector switch — As desired.
13. Cockpit temperature master switch — AUTO.
14. Bleed-air emergency switch* — NORM.

NOTE

The AN/APN 102 bleed air switch has been DEACTIVATED by T.O. 1F-100-996D*.

15. Cockpit temp — Toward HOT.
16. Canopy and windshield defrost lever — Toward INCREASE (set as desired).
17. Console airflow lever (or knobs) — Desired air distribution.

NOTE

For steps 15, 16, and 17, refer to "Normal Operation of Air Conditioning, Pressurization, Defrosting, Anti-icing, and Rain Removal System" in section IV.

18. QRC controls — OFF (STBY if required).
19. Emergency hydraulic pump lever (RAT) — OFF.

OXYGEN SYSTEM PREFLIGHT CHECK.**WARNING**

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

Before takeoff, the oxygen system should be checked with mask on and connected to the aircraft oxygen supply hose, then proceed 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. Diluter lever — 100%.
5. Breathe normally for a minimum of three cycles. The flow blinker should show alternately black and white.
6. Emergency lever to EMERGENCY position.
7. Hold breath. A white blinker indicates a leak.
8. Emergency lever — Return to center position, positive pressure should cease.
9. Diluter lever — NORMAL. Blinker should remain black. White blinker indicates a leak.

NOTE

It is possible for the white blinker to show by movement of the crew members head with respect to the regulator. Therefore, leaks should be detected by the movement of the blinker in relation to its "at rest" position.

10. Breathe normally for a minimum of three cycles. The flow blinker should show alternately black and white.

CAUTION

Do not leave the emergency lever at either positive pressure setting for more than 5 to 10 seconds unless the oxygen mask is attached, because the continuous flow of oxygen through the regulator will subject it to severe frosting conditions and possible permanent damage.

11. Diluter lever — As required.

*Some airplanes

F Electrical Power On.

1. DC external power – ON, if available.
2. Battery switch – ON.

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.

3. Engine master switch – ON.

CAUTION

To reduce the possibility of MM3 indicator failure caused by improper voltage and frequency output from the standby instrument inverter, allow a minimum of 30 seconds after dc power is applied before moving engine master switch to ON.

4. UHF control switch – BOTH.

5. Caution and warning lights – Check on. In addition to the master caution light being on, the canopy-not-locked warning light and the antiskid off, flight system fail, fuel boost pump inop, ac generator off, and dc generator off caution lights should also be on. To extinguish the master caution light, press all illuminated caution and warning lights.

6. Special store unlocked indicator light – Check.

7. Fire- and overheat-warning lights – Test(bright/dim).

8. Fuel quantity gages – Check. Check fuel quantity and test fuel quantity gage operation.

9. **F** Radio control transfer switch – Check.

10. Indicator, caution, and warning lights - Test (bright/dim) or press-to-test, as applicable.

11. Interior and exterior lights – As required.

- a. Instrument lights – As desired.

NOTE

On some airplanes, the instrument indirect lights are powered by the 3-phase instrument bus. During a cartridge start on these airplanes, the instrument indirect lights should be OFF until external power is applied or the engine is running. With a low-battery condition, these lights sometimes cause the standby inverter instrument inverter to require power sufficient to “pop” the inverter circuit breaker.

- b. Thunderstorm lights – As desired.

- c. Indicator light dimmer switch – As desired.

- d. Console lights – As desired.

- e. Magnetic compass light – As desired.

- f. Position lights – As required.

- g. Exterior floodlights* – As desired.

- h. Air refueling probe light switch – OFF.

BEFORE STARTING ENGINE.

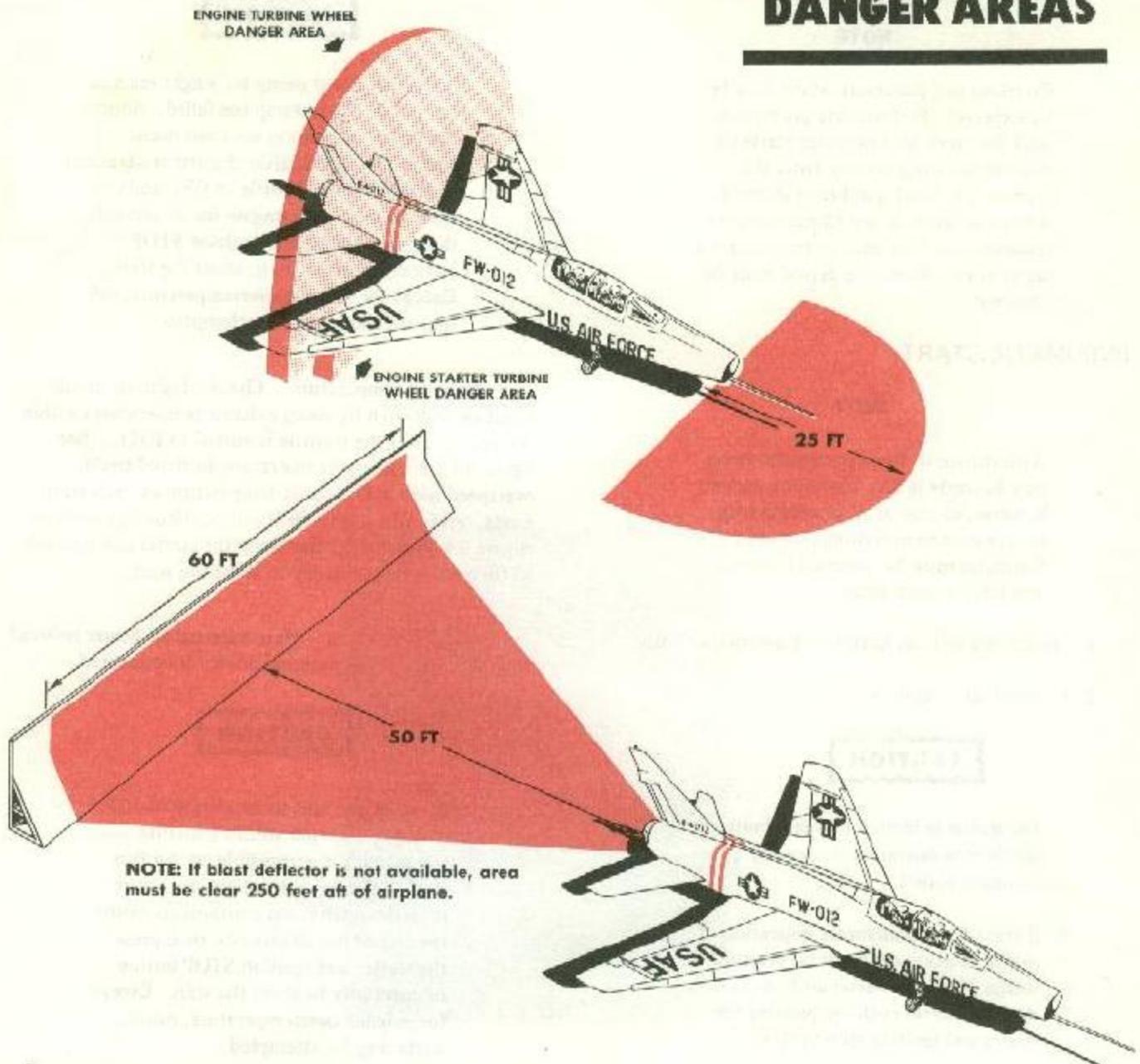
See figure 2-2 for danger areas.

WARNING

If the landing gear wheelwell 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



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

Exhaust temperature in BLACK FIGURES

Exhaust velocity (mph) in RED FIGURES

Figure 2-2

W-100F-1-75-110

STARTING ENGINE.**NOTE**

Cartridge and pneumatic starts may be interspersed. Perform one pneumatic start for every four cartridge starts to assist in removing residue from the starter. 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-minute period must be observed.

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.

1. Starter and ignition button – Press momentarily.
2. External air – APPLY.

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 10 seconds after air is applied, stop the starter cycle by pressing the starter and ignition stop button.

3. Throttle – IDLE at 12% to 16% rpm. Check ignition indicator light-on, a fuel flow indication and fuel boost pump inop light-out.

CAUTION

If the fuel boost pump inop light remains on, the dc boost pump has failed. Abort the flight. If ignition does not occur within 20 seconds after throttle is advanced to IDLE, return throttle to OFF and continue to motor the engine for 30 seconds; then press starter and ignition STOP button momentarily to abort the start. Except for exhaust overtemperature, subsequent starts may be attempted.

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.) If exhaust temperature exceeds start limits, return throttle to OFF and continue to motor the engine for 30 seconds; then press the starter and ignition STOP button momentarily to abort the start.

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

CAUTION

If the engine fails to accelerate to 55% to 60% (idle) rpm within 1 minute (80 seconds is permissible on the first start of the day) after light-up, return throttle to OFF and continue to motor the engine for 30 seconds; then press the starter and ignition STOP button momentarily to abort the start. Except for exhaust overtemperature, subsequent starts may be attempted.

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 40 psi; then check all engine instruments for proper indication.

CAUTION

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.

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.

- When a misfire or hang fire occurs the cartridge must be removed before a pneumatic start is attempted. The engine must not be started nor the aircraft flown with a live cartridge remaining in the starter breech.
- To avoid possible inhalation of toxic fumes during cartridge start, put oxygen mask in place and use 100% oxygen during starting cycle.
- When a misfire, or hangfire, is encountered during an attempted engine start, the breech of the starter will not be opened until a 5-minute time period has elapsed, and then only if no smoke can be observed emitting from the starter exhaust.

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 interval between starts. Perform one pneumatic start for every four cartridge starts to assist in removing cartridge residue from the starter.

- 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 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 ignition indicator light-on, a fuel flow indication and fuel boost pump inop light-out.

CAUTION

If the fuel boost pump inop light remains on, the DC boost pump has failed. Abort the flight.

3. Exhaust temperature — Check. Light-up should occur (as indicated by rising exhaust temperature) within 8 to 10 seconds after the throttle is moved to IDLE. (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 1 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 40 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 – UP.
2. Trim airplane for takeoff.
3. 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.

4. Hydraulic pressure failure caution light – Check light OUT. If light fails to go out after servicing and pressure is above 650 psi, a blocked system or run-around condition is indicated. Performance of steps 5 and 6 determines which system has malfunctioned. This condition must be corrected before flight.

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. A noticeable pressure drop must occur. 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, release stick completely and allow to return to trim. A noticeable pressure drop must occur. 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 building up.
- In steps 5 and 6, if no pressure drop is observed, the system is not functioning correctly or is connected improperly.

RUDDER HYDRAULIC SYSTEM CHECK.

CAUTION

Ensure that all ground personnel are clear of saddle-back area before commencing check, to prevent injury in the event the ram-air turbine door is operated.

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 be at or below 200 psi.

3. Rudder hydraulic system test switch — ALTERNATE RUDDER. Check pressure and operation. Move rudder pedals through full travel. Pressure should build up to 2800 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.

AC AND DC GENERATOR/FUEL BOOST PUMP CHECK.

If the ac generator has not come on the line after the engine has idled for 1 minute and to insure that the fuel boost pumps operation is properly checked, the following procedures should be followed:

1. DC boost pump test switch — OFF and hold. (Check boost pump INOP light — ON.)

CAUTION

If the centrifugal element of the engine driven fuel pump has failed, failing the DC boost pump with the AC generator off the line may cause a flameout. If the engine flames out, do not release the test switch until the throttle is moved to OFF.

2. Throttle — Advance until ac generator cuts in (72% RPM maximum). After the ac generator cuts in, the fuel boost pump INOP light should go OUT.

CAUTION

If the boost pump INOP light remains on, the ac pumps are unable to supply the engine with 5 psi fuel pressure and the flight should be aborted.

- If the ac generator caution light does not go out as engine reaches 72%, return throttle to IDLE and move ac generator switch momentarily OFF, RESET, 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 unit may be damaged if the ac generator switch is held longer than momentarily in the RESET position.

3. DC boost pump switch — RELEASE.
4. AC generator and instrument ac power caution light — OUT.
5. Loadmeters (ac and dc) — CHECK. Check loadmeter for proper readings — maximum 0.75.
6. Standby instrument inverter switch — OFF.

If the ac generator comes on the line before or at IDLE RPM, the following procedures should be followed:

1. DC boost pump test switch — OFF and hold for 3 seconds. (Check boost pump INOP light — OUT.) Holding the dc boost pump switch to OFF will shut down the dc boost pump. If the boost pump INOP light remains OUT, fuel pressure to the engine is 5 psi or more.

CAUTION

Illumination of the boost pump INOP light indicates that the ac boost pumps are unable to supply the engine with 5 psi fuel pressure and the flight should be aborted.

NOTE

The dc boost pump test switch has been wired through the nose gear OLEO strut switch to deactivate the test function during flight.

2. Proceed with steps 3 through 6 above.

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. Mode selector switch — MANUAL.
3. 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 standby instrument inverter comes up to speed and the ac loadmeter shows an increase.
4. Battery switch — OFF. The transformer-rectifier unit should now power the primary and secondary bus. Check for the fixed gun sight 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, the secondary bus tie in relay or the transformer rectifier is inoperative and the mission should be aborted.

5. 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.")

6. Battery switch — ON.

7. Mode selector switch — As desired.

8. NAV aids — ON.

9. Camera shutter selector switch — As desired.

EMERGENCY FUEL SYSTEM CHECK.

Test the emergency fuel control system as follows:

1. Fuel regulator selector switch — EMER. 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.

2. Fuel regulator selector switch — NORM. Return fuel regulator selector switch to NORM; a slight fluctuation of fuel flow should be noted.

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. Antiskid switch — ON. Wheel brakes — Check. Antiskid switch — OFF. Have crew chief check for proper brake action. If no brake action is indicated, return antiskid switch to OFF and abort the flight unless operational requirements dictate otherwise.

3. Speed brake — DOWN. Have ground crew check for proper operation. With pressure stabilized, move switch to in, note hydraulic pressure drop. The time required for the speed brake to close should not exceed 7 seconds. If pressure drops below 1300 psi the mission should be aborted because the priority valve in the speed brake hydraulic line may be faulty. Then move switch to OFF (center) position. However, if the speed brake required more than 7 seconds to close with engine operation at 60%, the utility pump is not operating properly and the aircraft should not be flown.

4. Wing flap handle — Cycle; then INTERMEDIATE. 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 at INTERMEDIATE.

YAW AND PITCH DAMPER GROUND CHECK.

1. Move yaw-pitch damper switch to ENGAGE. The switch should remain at ENGAGE when released. There should be no stabilizer movement. A slow rudder movement is normal.

2. Move control stick left. The rudder should follow left, then return to neutral.

3. Move control stick right. The rudder should follow right, then return to neutral.

4. Press damper emergency disconnect switch lever to disengage dampers. The yaw-pitch damper switch should move to OFF.

5. Move control stick left and right. There should be no corresponding rudder movement.

WARNING

If the damper remains engaged after the emergency disconnect has been activated, do not fly the aircraft.

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 movement are correct. After completing full trim check in both directions, release trim switches with stick in a full trim 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.

NOTE

On F-100F-11 airplanes AF 56-3785 through 3919 and F-100I-16 and later airplanes, the aileron trim travel to the left is reduced by half to permit carrying certain wing stores.

2. Trim for takeoff — Check. Hold takeoff trim button depressed until takeoff trim indicator light remains on steadily for a minimum of 2 seconds. Determine ability to obtain takeoff trim from either the full nose-down or nose-up position. Observe control centering and have ground crew check proper setting of horizontal stabilizer and rudder.

NOTE

The trim for takeoff light will not come on when the flap handle is full down.

- 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 takeoff trim setting, the leading edge is aligned within $\pm 5/16$ inch of the aft apex of the triangle.

SCRAMBLE/LAUNCH FROM COCKED POSTURE.

1. Personal equipment — Connected. Survival equipment, anti-G suit, ventilated suit and oxygen/radio leads.
2. Safety belt and shoulder harness — Fasten and adjust.
3. Battery switch — ON (dc external power connected if available).
4. Standby instrument inverter switch — ON.
5. Engine start.
6. Throttle — Advance until ac generator cuts in (72% rpm maximum).
7. Standby instrument inverter switch — OFF.
8. Safety pins — Remove, display to ground crew and stow.
9. Oxygen — 100%.
10. Engine pressure ratio gage — Set.
11. Altimeter — Set and check. Reset vs STBY.
12. Nose wheel steering — Engage and check. Press nose wheel steering button and move rudder pedals slightly. Check for airplane response.
13. Canopy — Check; then as desired.
14. Chocks — Removed.

BEFORE TAXIING.

NOTE

Before taxiing, be sure there is proper clearance for the airplane. See figure 2-3 for minimum turning radius and ground clearance.

1. Safety pins — REMOVE ground safety pins from right hand grip of ejection seat and from canopy alternate emergency jettison handle. On F-100F airplanes, remove wind screen safety pin. Signal ground crewman

crewman should then show or present pins to pilot. In the cockpit, remove ground safety pins from right handgrip of ejection seat and from canopy alternate emergency jettison handle. On F-100F airplanes, remove wind-screen safety pin.

WARNING

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

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

2. Navigation aids — Check.

3. Oxygen — 100%.

4. Engine pressure ratio gage — Set. Set engine pressure ratio gage takeoff index marker according to outside air temperature. (See figure 2-4.)

5. Altimeter — Set and check. The maximum allowable difference between the RESET and STBY mode is 75 feet.

WARNING

A careful cross-check of counters, drum, and pointer should be made on AAU-21 and AAU-19 altimeters since the 1,000-foot counter can be incorrectly adjusted.

- When operating aircraft with two AAU-19/A, one should be operated in the STBY mode. Frequent altimeter crosschecks between cockpits must be made.

6. Windshield exterior air — as required to eliminate moisture.

7. Nose wheel steering — Engage and check. Nose wheel steering button — press and move rudder pedals slightly. Check for airplane response to nose wheel steering.

8. 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.

WARNING

Do not place hands or arms on the canopy rail at anytime the canopy is in the open position. If the canopy should suddenly fall closed, serious injury would result.

9. 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.

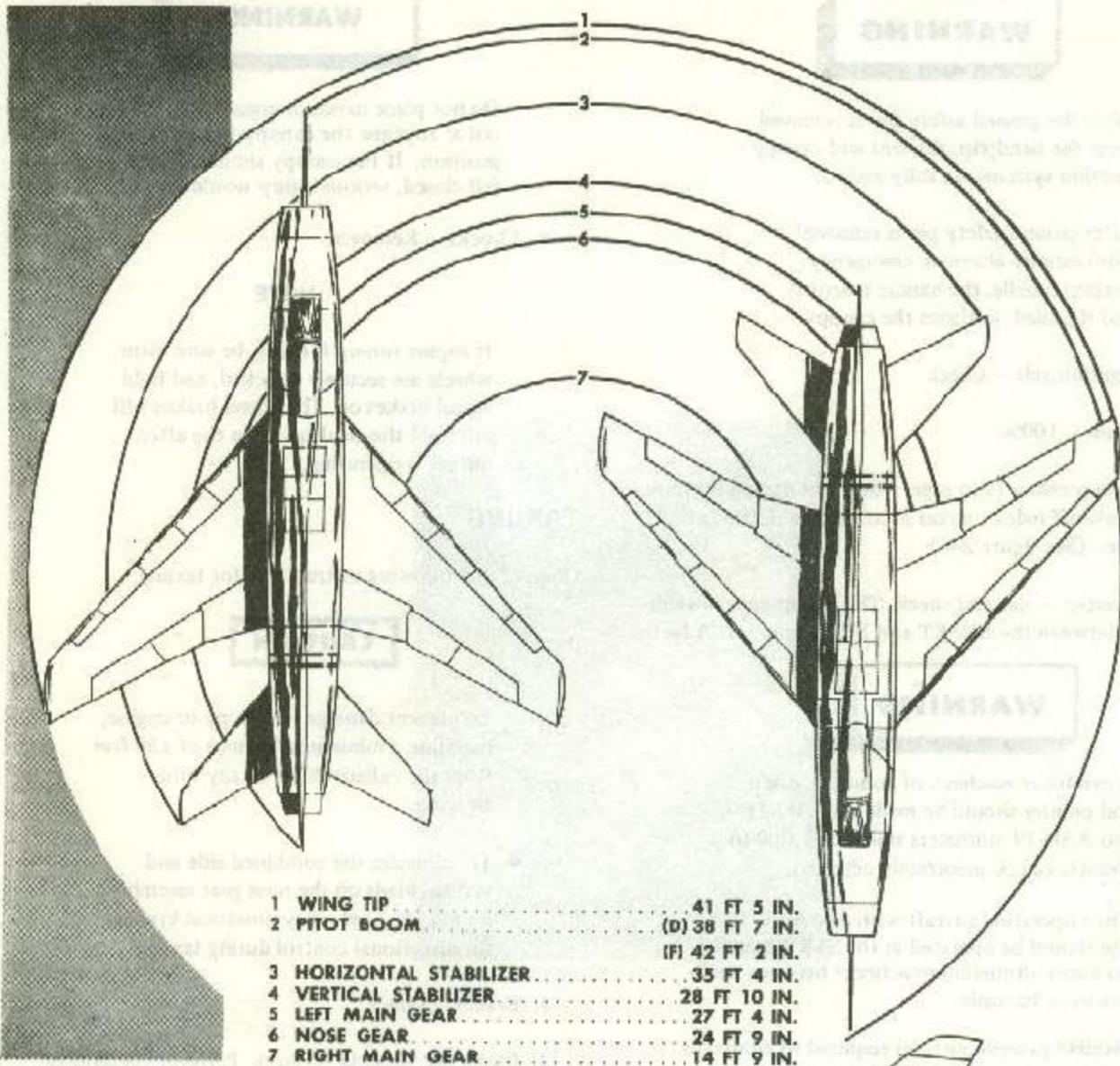
- To minimize the combined side and vertical loads on the nose gear assembly, do not use hard, unsymmetrical braking for directional control during taxiing.

1. Brakes — Check.

2. Flight instruments — Check. Perform operational check of all flight instruments during taxiing. Check heading indicator for incorrect or sluggish operation.

3. 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.

TURNING RADIUS AND GROUND CLEARANCE



1 WING TIP	.....	41 FT 5 IN.
2 PITOT BOOM	.....	(D) 38 FT 7 IN.
		(F) 42 FT 2 IN.
3 HORIZONTAL STABILIZER	.....	35 FT 4 IN.
4 VERTICAL STABILIZER	.....	28 FT 10 IN.
5 LEFT MAIN GEAR	.....	27 FT 4 IN.
6 NOSE GEAR	.....	24 FT 9 IN.
7 RIGHT MAIN GEAR	.....	14 FT 9 IN.

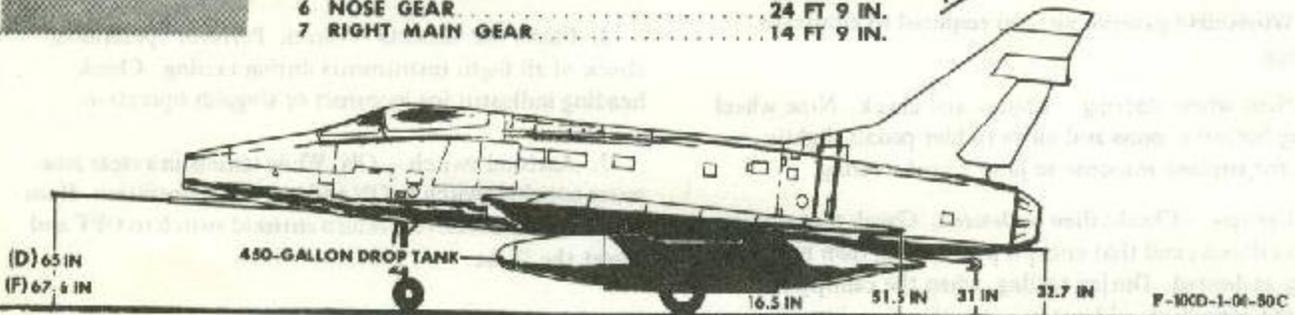


Figure 2-3

12' 7" main to main

EPR GAGE SETTING

D INDEX SETTING		OUTSIDE AIR TEMPERATURE		F INDEX SETTING	
-21	-23	°F	°C	-21	-23
1.82	1.79	122	50	1.80	1.76
1.84	1.80	118	48	1.82	1.78
1.85	1.82	115	46	1.83	1.79
1.86	1.83	111	44	1.84	1.81
1.87	1.85	108	42	1.85	1.83
1.88	1.86	104	40	1.86	1.84
1.89	1.88	100	38	1.87	1.86
1.90	1.89	97	36	1.88	1.88
1.91	1.91	93	34	1.89	1.89
1.92	1.93	90	32	1.90	1.91
1.93	1.94	86	30	1.91	1.92
1.94	1.96	82	28	1.93	1.94
1.96	1.97	79	26	1.94	1.95
1.97	1.99	75	24	1.95	1.97
1.98	2.00	72	22	1.96	1.98
1.99	2.02	68	20	1.97	2.00
2.01	2.03	64	18	1.99	2.01
2.02	2.05	61	16	2.00	2.03
2.03	2.06	57	14	2.01	2.04
2.04	2.08	54	12	2.02	2.06
2.05	2.09	50	10	2.03	2.07
2.06	2.10	46	8	2.04	2.09
2.07	2.12	43	6	2.05	2.10
2.09	2.13	39	4	2.07	2.11
2.10	2.15	36	2	2.08	2.13
2.11	2.16	32	0	2.09	2.14
2.13	2.17	28	-2	2.11	2.16
2.14	2.19	25	-4	2.12	2.17
2.16	2.20	21	-6	2.14	2.18
2.17	2.21	18	-8	2.15	2.20
2.18	2.23	14	-10	2.16	2.21
2.20	2.24	10	-12	2.17	2.22
2.21	2.26	7	-14	2.19	2.24
2.22	2.27	3	-16	2.20	2.25
2.23	2.28	0	-18	2.21	2.26
2.25	2.29	-4	-20	2.22	2.27
2.27	2.30	-8	-22	2.24	2.29
2.28	2.31	-11	-24	2.25	2.30
2.29	2.32	-15	-26	2.26	2.31
2.30	2.33	-18	-28	2.27	2.32
2.32	2.34	-22	-30	2.29	2.33
2.34	2.35	-26	-32	2.32	2.34
2.35	2.36	-29	-34	2.33	2.35
2.37	2.37	-33	-36	2.35	2.36

Figure 2-4

*F-100F Airplanes

BEFORE TAKEOFF.

PREFLIGHT AIRPLANE CHECK.

After taxiing to takeoff area, complete the following checks:

1. Zero-delay lanyard hook – Check attached (if applicable).
2. Hydraulic pressure gage selector switch – UTILITY.
3. Speed brake switch – IN, then OFF (center). Check speed brake UP; then move switch to OFF (center) position.
4. Flaps – INTERMEDIATE.
5. Takeoff trim – Recheck.
6. 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 takeoff. The handle must be in and safetied when the SUU-21/A 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 unlocked indicator light should come on just before the full stop position is reached.

7. Pitot heat – ON.
8. IFF/SIF/AIMS – As required.
9. Canopy – Closed and locked. Hold switch at CLOSE 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 pushed to the locked position.
10. Anti-collision light – ON. (As required.)

PREFLIGHT ENGINE CHECK.

1. Throttle – Military Thrust.

NOTE

Engine acceleration time from IDLE to Military Thrust should not exceed 15 seconds.

2. Flight controls – Check pressures and full travel.

3. Engine instruments – Check. Check engine instruments for proper reading at Military Thrust.

a. Oil pressure – 40 psi minimum.

b. Exhaust temperature – 540°C minimum. Refer to section V.

CAUTION

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

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

NOTE

Minimum exhaust temperature for takeoff is 540°C. Lower EGT is permissible if maintenance has checked the EGT and EPR system for proper calibration, and the engine for proper trim.

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 takeoff index marker. If Military Thrust check results in an acceptable reading and afterburner takeoff is to be made, readjust takeoff 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 takeoff 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.

4. Adjust heat and vent – As required.

WARNING

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

TAKEOFF.

NORMAL TAKEOFF.

NOTE

Takeoff at Military Thrust is not recommended.

For normal takeoff with or without external load, proceed as follows:

1. Brakes – Release.

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 limits outlined in section V.

WARNING

Takeoff should be aborted immediately if any directional change is noted when the afterburner is ignited. A directional change at this time could indicate possible afterburner nozzle malfunction which could cause side forces to be applied to the extent that rudder would be insufficient to control the airplane immediately after leaving the ground.

NOTE

The BOOST PUMP INOP light may flicker on when lighting the afterburner. If the light comes on or is flickering during takeoff roll before the normal acceleration check, abort the takeoff. If the light comes on or begins flickering during the takeoff roll after the normal acceleration check, the decision to continue the takeoff or abort is left to the pilot's discretion. Gravity flow of fuel to the engine driven fuel pump is adequate for afterburner operation during takeoff.

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, and abort the takeoff.

NOTE

If afterburner does not light on first attempt, takeoff should be aborted.

3. Engine pressure ratio gage — Check. Immediately following afterburner light-up, recheck engine pressure ratio gage. The pointer should be within the arc of the takeoff index marker. Takeoff should be aborted if the pressure ratio is not correct. It is important to check the gage before takeoff roll has progressed too far, because the pointer will continue to rise as the airspeed increases.

NOTE

During takeoff 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 stick. Avoid using brakes if possible, because excessive takeoff distances will result.

4. Acceleration — Check.

5. Nose rotation. At the computed rotation speed for the gross weight and configuration, apply back stick pressure and begin to rotate the airplane. The rotation rate should be such that the airplane will assume the pitch angle (8° to 10°) required for lift-off at the recommended takeoff speed.

WARNING

Premature nose wheel lift-off can result in excessive ground roll. Care must be taken to ensure that the airplane is not rotated to an excessively nose-high attitude. (In case of overrotation, reduce angle of attack and assume the proper takeoff attitude.)

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

6. Takeoff. Maintain the takeoff attitude after breaking ground until sufficient airspeed and altitude is attained, to prevent settling back onto the runway.

CROSS WIND TAKEOFF.

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

When takeoff is accomplished in the presence of gusty winds or strong cross winds, rotation speeds must be increased to provide additional control margin. When winds are gusty, regardless of direction, add one-half the gust factor. In addition, rotation speed should be increased by one-half the velocity of direct crosswind component. This will provide the control margin necessary and reduce any tendency for "airplane skip". For example, if the wind were 45 degrees off runway heading at 10, gusting to 20 knots, rotation speed should be increased 9 knots. Any resulting increase in takeoff speed will produce a proportionate increase in takeoff distance.

TAKEOFF WITH ASYMMETRICAL LOADS.

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

AFTER TAKEOFF — CLIMB.

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

1. Gear — 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.

2. Flaps — UP.

CAUTION

The higher drag and higher gross weight possible when carrying external loading configurations which include stores on TER's result in poor climbout performance after takeoff. To obtain normal climb performance, do not raise the wing flaps until an airspeed of 210 to 220 knots IAS is attained.

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

NOTE

Maximum thrust should be maintained until approximately 300 knots IAS is attained.

4. Climb speed — Establish. Accelerate to best climb speed while maintaining a shallow climb.

NOTE

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

5. Climb check (2000 to 5000 feet AGL).

- a. Oxygen regulator diluter lever — NORMAL.
- b. Special store unlock handle — LOCK, if unlocked.
- c. Damper switches — As required.

d. 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. Moving the drop tank selector switch to OFF will allow fuel to drain back into the intermediate drop tanks. 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 is indicated until the light comes on again with about 1500 pounds total fuel remaining. The light will go out when the selector switch is 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.

TAKE OFF AND INITIAL CLIMB (TYPICAL)

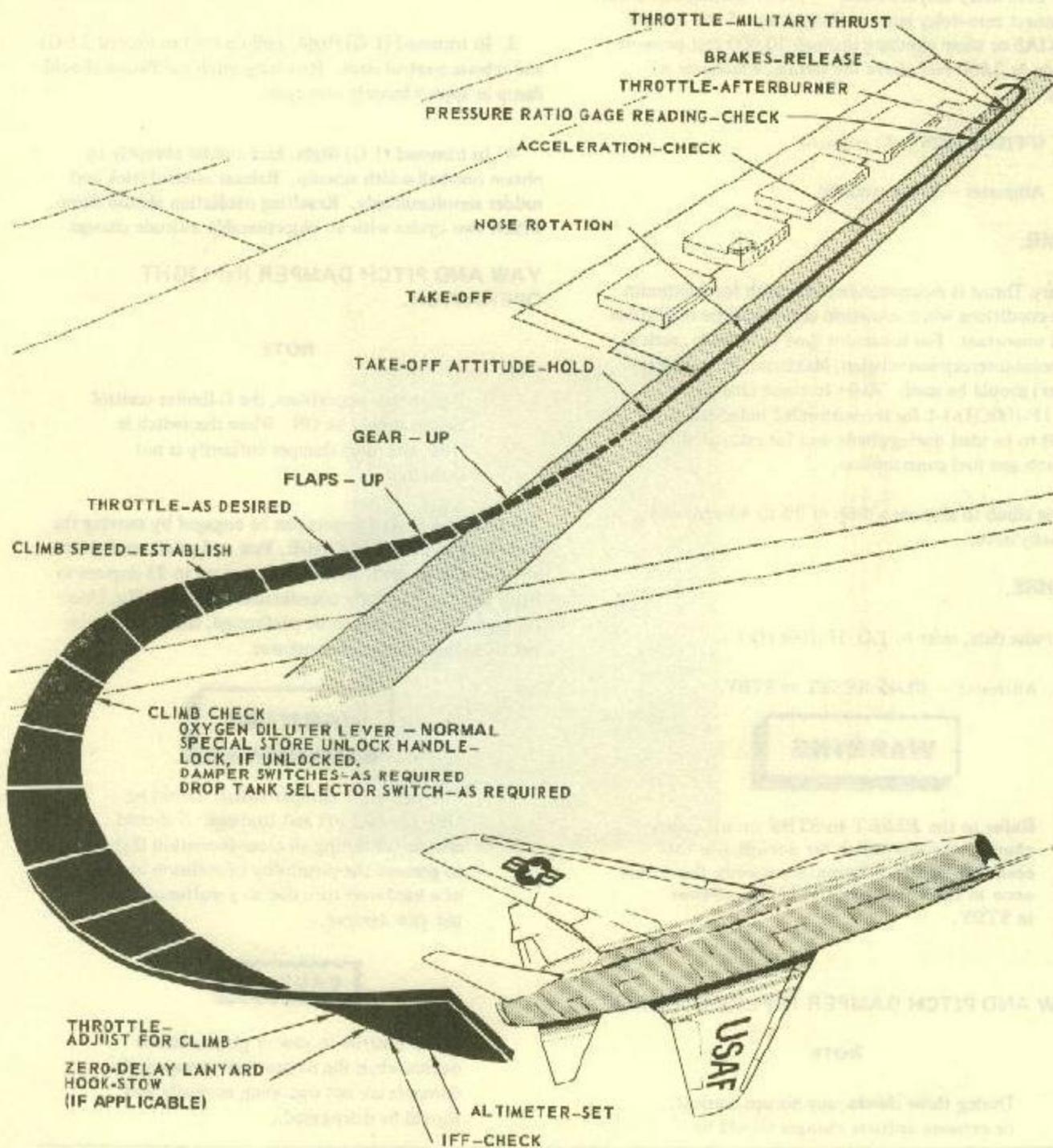


Figure 2-5

CAUTION

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

7. Zero-delay lanyard hook* — Stow. During climb-out, disconnect zero-delay lanyard if climb speed will exceed 350 KIAS or when climbing through 10,000 feet pressure altitude or 2,000 feet above the terrain, whichever is higher.

8. IFF/SIF/AIMS — As required.

9. Altimeter — Set as required.

CLIMB.

Military Thrust is recommended for climb for maximum range conditions when minimum climbing time to altitude is not important. For minimum time to altitude, such as in a point-interception mission, Maximum Thrust (afterburner) should be used. Refer to climb charts in T.O. 1F-100C(1)-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-100C(1)-1-1.

1. Altimeter — Check RESET vs STBY.

WARNING

Refer to the RESET to STBY cross check chart in the checklist for acceptable tolerances. If the difference exceeds the tolerance in the checklist, leave the altimeter in STBY.

YAW AND PITCH DAMPER INFLIGHT CHECK.**NOTE**

During these checks, any abrupt, violent, or extreme attitude changes should be

recorded and the flight check should be discontinued.

1. With yaw-pitch damper switch at OFF, deflect and hold rudder to obtain 1/2-ball-width sideslip.

2. Move yaw-pitch damper switch to ENGAGE. The ball should return to center, 1/8-ball-width.

3. 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.

4. In trimmed (1 G) flight, kick rudder abruptly to obtain one-ball-width sideslip. Release control stick and rudder simultaneously. Resulting oscillation should damp within two cycles with no objectionable attitude change.

YAW AND PITCH DAMPER INFLIGHT OPERATION.**NOTE**

For normal operations, the G-limiter control switch should be ON. When the switch is OFF, the pitch damper authority is not G-limited.

The yaw and pitch dampers can be engaged by moving the yaw-pitch switch to ENGAGE. Yaw and pitch oscillations will be well damped, and rolling turns up to 75 degrees to 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 OFF for takeoffs and landings. It should also be off 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 occurs when the dampers are engaged, the dampers are not operating normally and should be disengaged.

*Some airplanes

NOTE

As the bank angle approaches 90 degrees, damping of the rudder and stabilizer becomes less effective and dampers will not fully coordinate turns.

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 manual afterburner shutoff is designed to provide increased nonafterburning thrust for operation following certain failures affecting the engine afterburner system.

The AB can be operated at any engine speed between that obtained at Military Thrust and $89\% \pm 2\%$. During AB operation, the least fuel consumption per pound of thrust output is obtained when the engine is operating at a 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. Select AB at full-throttle position and then retard throttle slightly. This will minimize the possibility of engine over-temperature, hard lights, and compressor stalls. 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 ignition above 45,000 feet, and blowout-free operation up to the service ceiling of the airplane.

*Some airplanes

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

☐ 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 manually. Verbally check with rear cockpit pilot that throttle is clear.

FLIGHT CHARACTERISTICS.

Refer to section VI for information regarding flight characteristics.

DESCENT.

The windshield and canopy defrosting systems 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, 83% rpm.

1. Pitot heat* - ON.
2. Canopy and windshield defrost lever - As required.
3. IFF/SIF/AIMS - Set as required.

4. Altimeter — Set and check RESET vs STBY.

5. Zero-delay lanyard hook* — Connect. For instrument descents, connect the zero-delay lanyard before initial penetration. For other descents, the lanyard must be connected at 10,000 feet pressure altitude or 2000 feet above the terrain, whichever is higher.

6. Damper switches — STANDBY (OFF).

7. Oxygen — As required.

8. Fuel quantity — Check.

9. Special store unlock handle — UNLOCK, if required. If an empty Type VII or VIII 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.

BEFORE LANDING.

During approach to the field, make the following checks:

1. Hydraulic pressures — Check. Monitor utility system during approach and landing.

2. Safety belt and shoulder harness — Tightened.

3. Anti-skid — ON.

4. Speed brake — As desired.

5. Gear — DOWN. Lower gear and check for a down-and-locked indication.

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

LANDING.

NORMAL LANDING.

1. Throttle — IDLE. Retard throttle to IDLE during flare or at touchdown.

2. Touchdown.

3. Flaps — UP.

4. Nose wheel steering — Engage.

CAUTION

If the nose wheel steering system malfunctions, disengage and maintain directional control with rudder and differential brakings.

- 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). If the steering does not engage, the pedals must be moved in the direction of the nose wheel setting to obtain steering.

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.

5. Drag chute — Deploy.

CAUTION

Care should be taken not to rotate the drag chute handle to the jettison position. "Snapping" the drag chute handle out sometimes causes accidental chute jettisoning. Deploying the drag chute with the palm up will decrease the chance of inadvertant jettisoning.

*Some airplanes

6. Employ normal braking technique.
7. Speed brake — UP.

NORMAL LANDING TECHNIQUE.

Assume that the landing gross weight is 25,000 pounds. (Speeds quoted will vary with gross weight.) Below 230 KIAS on downwind, lower the landing gear and wing flaps. Fly the base leg at 20 knots above final approach speed. This will require about 83% to 87% rpm. Plan rolling out of turn so as to arrive on final with 166 knots IAS for this landing gross weight. At this time, distance from the end of the runway is approximately one nautical mile and altitude is approximately 300 feet AGL. This will result in a glide path between 2 and 3 degrees that intercepts the overrun slightly short of the end of the runway. This approach path should be maintained until the flare is initiated. On final to make small adjustments in airspeed, use pitch as primary control and for small adjustments in rate of descent use throttle. Larger adjustments may dictate use of a combination of both and/or speed brakes. Precise airspeed control on final is essential to properly flare and touchdown on speed at the desired touchdown point; therefore, adjust speed, thrust, and rate of descent as necessary to arrive at touchdown point at desired speed. Reduce thrust to idle as necessary prior to touchdown.

CAUTION

Arresting cables can severely damage the tail skid and aft section if contacted with the nose wheel off the runway. The touchdown point should be planned to avoid landing directly on the arresting gear or rolling over it with the nose in the air.

NOTE

As a rule of thumb, 10 knots too fast at touchdown means approximately an additional 1000 feet of ground roll.

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.

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 touchdown. 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 is 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. When practicable the full length of the runway should be used during landing roll to reduce brake heating and wear.

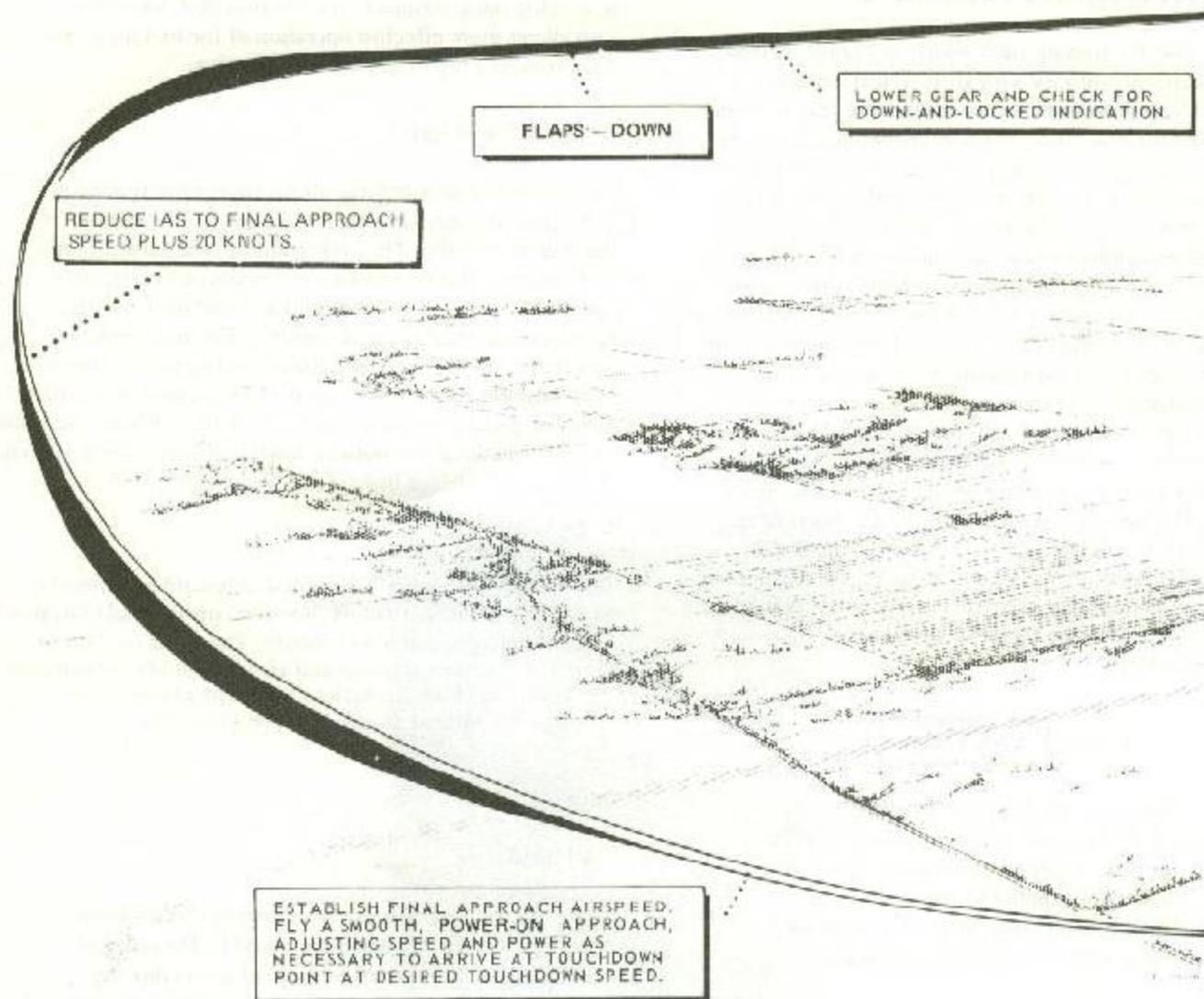
Drag Chute Operation.

Drag chutes have been flight-tested at touchdown speeds up to 180 knots without failure; however, operational reliability is greatly increased at lower speeds. 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.

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.

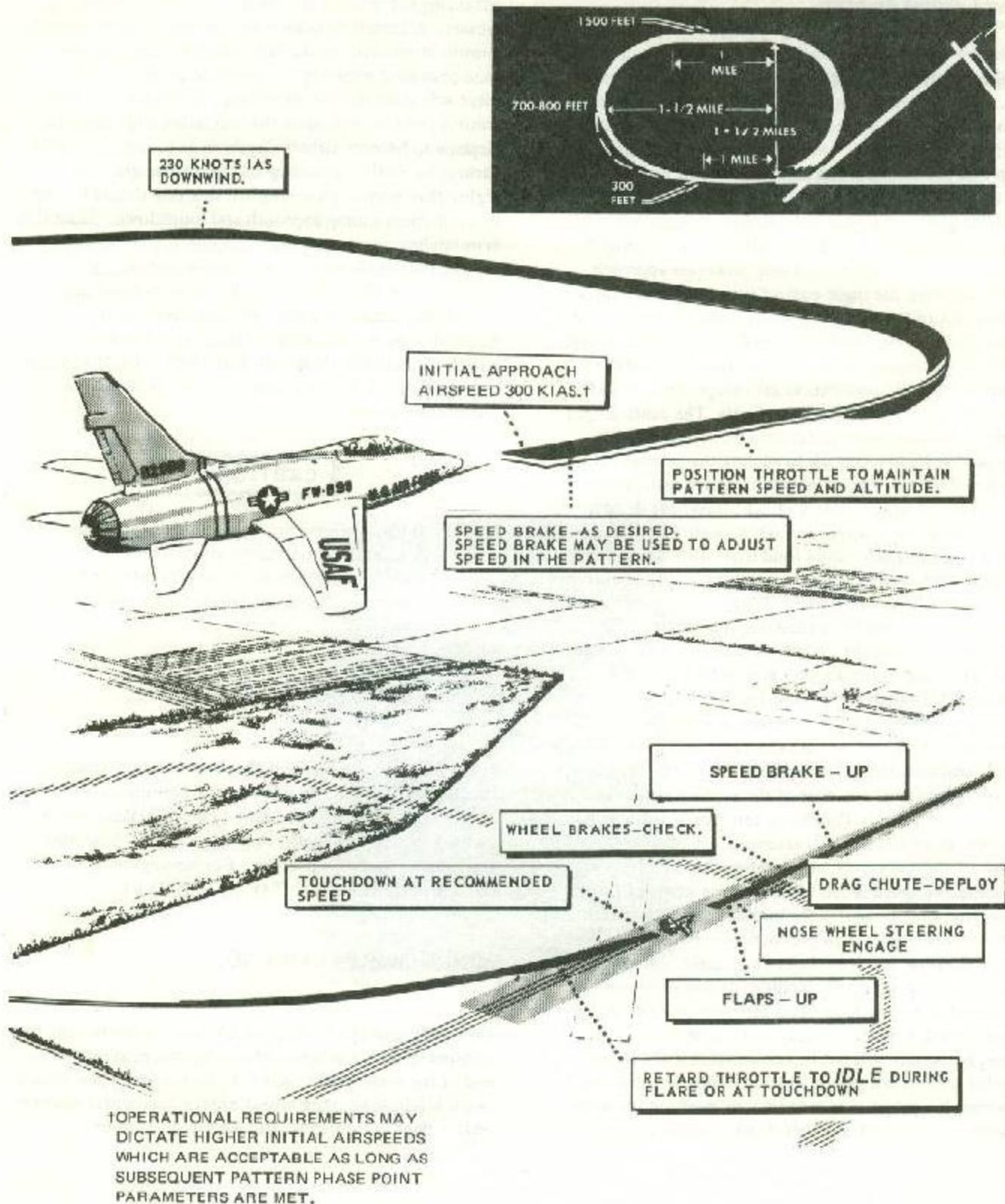
LANDING PATTERN (TYPICAL)



NOTE

- To avoid stick force lightening during turn on to base and final, do not exceed a 50-degree bank turn or 1.6 G at recommended 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.
- 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.

Figure 2-6 (Sheet 1 of 2)



F-100F-1-00-555

Figure 2-6 (Sheet 2 of 2)

Other Landing Pointers.

At landing airspeeds, airplane response is sluggish, and more stabilizer deflection is required for the same airplane reaction. 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, power-on approach. Over-controlling 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. 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. A stick-force lightening occurs about 5 knots IAS below the recommended touchdown speed for the 1G 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 can also 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, to execute a go-around. Attempts to counteract the bounce with opposite control movement should be avoided, as pilot reaction 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 airborne again so as to reduce possible damage by further bounding on the landing gear. At higher than normal gross weights, sink rate should be kept to a minimum during approach and touchdown. Since this type landing requires increased approach and touchdown speeds, the normal technique of trimming/holding forward stick pressure after touchdown should be delayed until the aircraft has decelerated to a safe drag chute deployment airspeed using aerodynamic braking (by holding nose wheels off, and full flaps until 120 KIAS). The drag chute can be deployed with the nose in the air, if crosswind conditions permit.

CAUTION

If aerodynamic braking is used during crosswind conditions, rudder control may be insufficient to prevent weather vaning and the crosswind landing procedure should be used.

LANDING WITHOUT DRAG CHUTE.

If a landing is made without the drag chute, adequate braking will be available to stop on a dry runway using the normal landing technique. Aerodynamic braking can also be used to dissipate energy down to a speed where mechanical braking becomes effective. For landing distance without a drag chute, refer to T.O. 1F-100C(1)-1-1.

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 about 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.

On a slippery runway (wet or icy), braking effectiveness varies greatly. When the runway condition reading is reported less than 12, it is imperative that immediate antiskid and aerodynamic braking be used and that the drag chute be deployed (while the nose gear is held off). 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.

HYDROPLANING.

Hydroplaning, in its meaning here, is a condition where the tires of the airplane are separated from the runway surface by a fluid. Under conditions of total hydroplaning, the hydrodynamic pressures between the tire and runway lift the tires off the runway to the extent that wheel rotation slows and actually stops. The major factors in determining when an airplane will hydroplane are forward speed and tire pressure. To a lesser degree, the airplane gross weight, depth of water on the surface, texture of the surface, type of tire used, and condition of the tires influence the total hydroplaning speed. Total hydroplaning in this airplane with recommended tire pressures and 1/8 to 1/4 inch of water or slush on the runway can be expected at approximately 115 knots IAS for the nose gear tires and 145 knots IAS for the main gear tires. Hydroplaning is aggravated in landings with a tail-wind component, because of increased ground speeds. Partial hydroplaning occurs to varying degrees below these speeds.

Whenever an airplane is subjected to hydroplaning to any degree, directional control becomes difficult. Under total hydroplaning conditions, nose wheel steering is ineffective and wheel braking is nonexistent.

The adverse effects of hydroplaning can be minimized by consideration and application of the following:

1. Smooth tires tend to hydroplane with as little as 1/10 inch of water and possibly at slightly lower speeds. Ribbed tires tend to release hydrodynamic pressures and will not hydroplane until water depth is 2/10 to 3/10 inch.
2. Takeoffs with extreme cross-winds and water-covered runways should be made with caution. When lift-off speed is greater than hydroplaning speed, the airplane is subjected to the effects of the cross-wind while hydroplaning.
3. An aborted takeoff on a wet runway initiated at or near hydroplaning speed will require considerably more runway than one aborted on a dry runway.

Recommended precautions to follow when faced with possible hydroplaning:

1. Avoid making formation takeoffs or landing for obvious reasons.

2. Use normal approach and touch down speed. A fast landing only encourages the onset of hydroplaning.

3. Plan to land on the upwind side of the runway to provide maximum runway width as protection against a downwind drift.

4. With a crosswind, be especially careful in attempting aerodynamic braking and drag chute operation.

5. When the runway and wind condition look questionable consider a barrier arrestment.

6. Use the anti-skid system throughout the landing roll.

7. Keep in mind that sometimes the best course is to proceed to your preplanned alternate.

LANDING WITH ASYMMETRICAL LOADS.

Refer to "Flight With External Loads and TER Carriage Characteristics" in section VI.

LANDING IN TURBULENCE/CROSSWIND.

For landing in turbulence or jet wash, approach and touch-down speeds should be increased to provide additional control margin. When winds are gusty, regardless of direction, add one-half the gust factor. In addition, speeds should be increased by one-half the velocity of direct crosswind component. For example, if the wind were 45 degrees off runway heading at 10, gusting to 20 knots, approach and touchdown speeds should be increased 9 knots.

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 crosswind component exceeds 25 knots, a no-flap landing should be made. At touchdown, lower nose wheel to runway as soon as possible.

WARNING

With a loaded TER at one inboard station only, the asymmetric drag is more pronounced than for other approved asymmetric loading configurations, resulting in larger rudder angles required for trim. Rudder trim requirements may become critical if landing in a crosswind.

After nose wheels touch down and nose wheel steering is engaged, deploy drag chute. Because of the weather-vaning 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 crosswind landing. However, if weather-vaning 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 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.

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

1. Normal touchdown.

2. Throttle – Military Thrust.
3. Speed brake – UP.
4. Flaps – INTERMEDIATE.

CAUTION

Care should be exercised when moving the flap handle to INTERMEDIATE.

5. Trim. Trim airplane for approximate takeoff 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 takeoff speed.

WARNING

Make certain proper airspeed has been attained before rotating the airplane to takeoff attitude. Care must be taken to ensure that the airplane is not rotated to an excessively nose-high attitude. (In case of overrotation, reduce angle of attack and assume the proper takeoff attitude.)

7. Takeoff. Maintain the takeoff attitude after breaking ground until sufficient airspeed and altitude is attained to prevent settling back onto the runway.

8. Gear – UP.

9. Flaps – UP. Increase pitch angle during flap retraction, to prevent settling.

GO-AROUND.

For making a go-around, see figure 2-7 for complete procedure.



CAUTION

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.

AFTER LANDING.

The following procedures will be accomplished after departing the runway.

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. Anti-skid switch – OFF.
2. IFF/AIMS and navigation aids – OFF.
3. AIMS Mode 4 Code Select Switch – Hold (if mode 4 codes are to be retained).

GO-AROUND

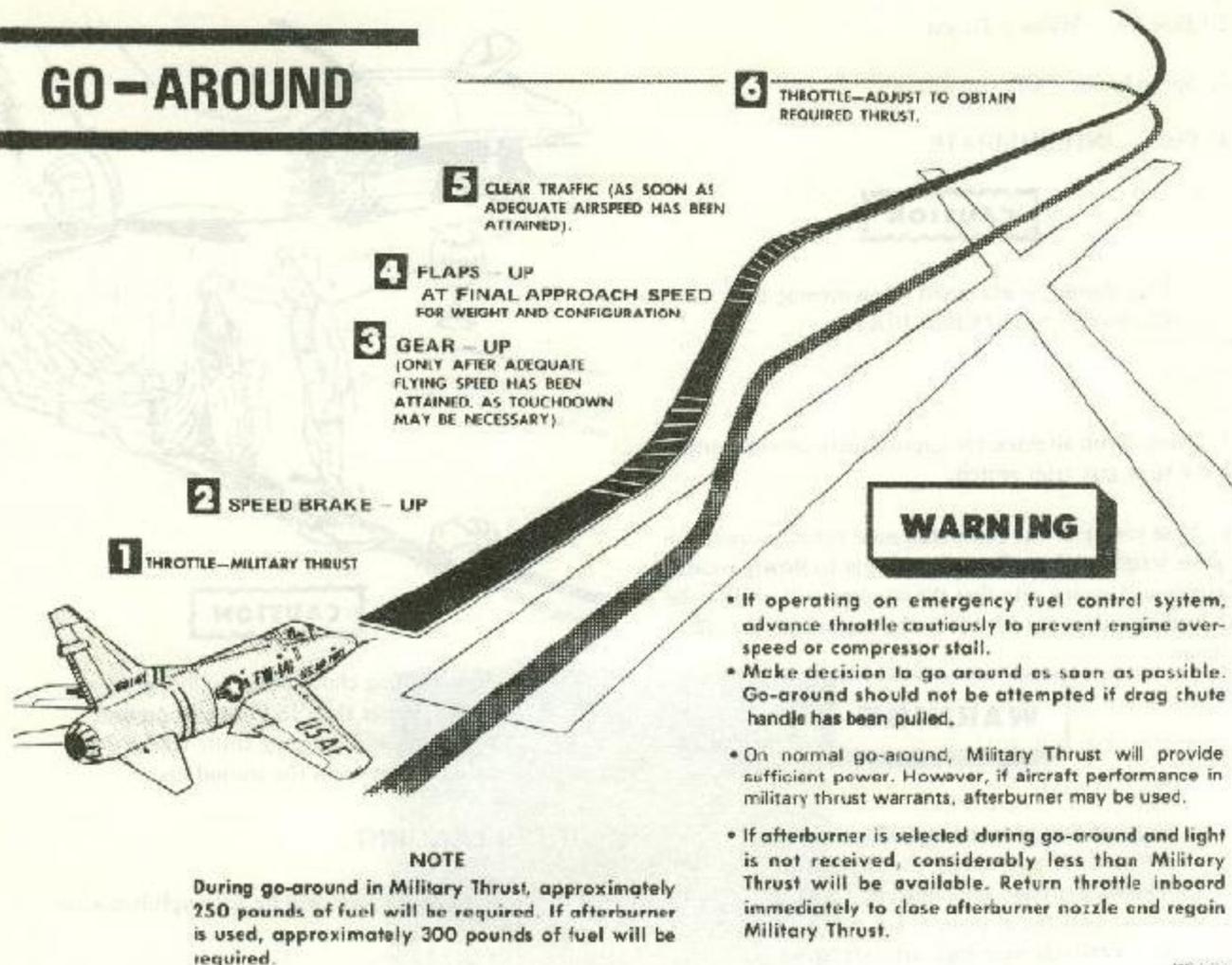


Figure 2-7

4. Canopy — As desired.

5. 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.

6. Safety pins — Installed. Install ground safety pin through right handgrip of ejection seat, in canopy alternate emergency jettison handle, and, on F-100F airplanes, in windscreen.

7. Trim airplane for takeoff.

8. Special store unlock handle — LOCK, if unlocked.

9. Station selector switches* — SAFE.

10. Pitot heat — OFF.

11. Windshield exterior air — OFF.

12. Anti-Collision lights — OFF.

13. Position lights — As required.

14. Taxi light — As required.

ENGINE SHUTDOWN.

The engine must be operated for 5 minutes below 85% rpm before shutdown, to stabilize engine temperatures. (Taxi

*Airplanes changed by T.O. 1F-100D-632.

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. Brakes – Hold.
2. Standby inverter – ON.
3. Throttle – 72% for at least 30 seconds.

NOTE

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

- 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. Nose gear ground safety pin – Installed.
 6. Throttle – OFF. Make sure throttle is moved fully aft and then inboard to OFF.
 7. Engine master switch – OFF.
 8. Standby inverter – OFF.
 9. Battery switch – OFF.

NOTE

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

- Do not place battery switch off until the DC generator is off the line.
10. 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.
 11. Landing gear doors – Open (closed for cocking). Pull landing gear emergency lowering handle to open landing gear wheel well doors.

CAUTION

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 press 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. Chocks – In place.
2. Electrical switches – OFF. All electrical switches off, except ac and dc generator switches and pressurization controls.
3. Seat handgrips – Check. Check that seat handgrips are full down and latched, by applying a moderate downward force on each handgrip.
4. Deleted.
5. Parachute arming lanyard key – Snap in retainer.

6. 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, when unusual strains are encountered during air refueling, cartridge starts and/or if any *in-flight* engine compressor stalls or severe compressor stalls during taxiing were encountered. (Refer to "Compressor Stall" in section VII.) Entries must also be made when, in the pilot's judgment, the airplane has been exposed to unusual or excessive operations such as hard landings, refueling drogue has contacted the canopy, excessive braking action during aborted takeoffs, long and fast landings, and long taxi runs at high speeds, etc.

COCKING AFTER SHUTDOWN.

If the airplane is taxied to the alert area or if the engine is started for preflighting the airplane before going on alert, the following should be performed after engine shutdown to "cock" the airplane. (Refer to "Scramble/Launch From Cocked Posture" in this section.)

1. Wing flap handle - INTERMEDIATE.
2. Engine master switch - ON.
3. Fuel System shutoff switch - Safetied ON.
4. IFF/SIF/AIMS and NAV aids - As required.
5. Pitot heat - ON.
6. Interior and exterior lights - As required.

CAUTION

After the airplane has been cocked, external power must not be applied

and/or the battery switch turned ON until immediately before engine start. Primary bus power will open the fuel shutoff valve and operate the flap control motor.

TRANSFER OF FUEL FROM PARTIALLY FULL DROP TANKS.

Takeoff with partial fuel in the baffled 450-gallon drop tanks, 335-gallon drop tanks or the type III 275-gallon drop tanks is permissible providing the store index number is adjusted prior to flight. Unbaffled 450-gallon drop tanks must be full or empty for takeoff. (Refer to section V.) Partial fuel load must be transferred out of the drop tanks before takeoff. To transfer 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.

1. Drop tank fuel selector switch - Check at INTERM.
2. Standby instrument inverter switch - ON. This will provide ac power to the fuel quantity indicating system.
3. AC generator switch - OFF. Aft and intermediate tank transfer pumps will be inoperative, preventing transfer of fuel from these tanks to the forward tank.
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 drop tanks are empty. Then proceed to step 6.

NOTE

Cross-check drop tank fuel quantity gages (450-gallon tanks) for empty indication.

6. AC generator switch — ON.
7. Standby 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-100C(I)-6WC-1, and -1PO.

LOADING CARTRIDGE STARTER.

See figure 2-8 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 F-58A 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.

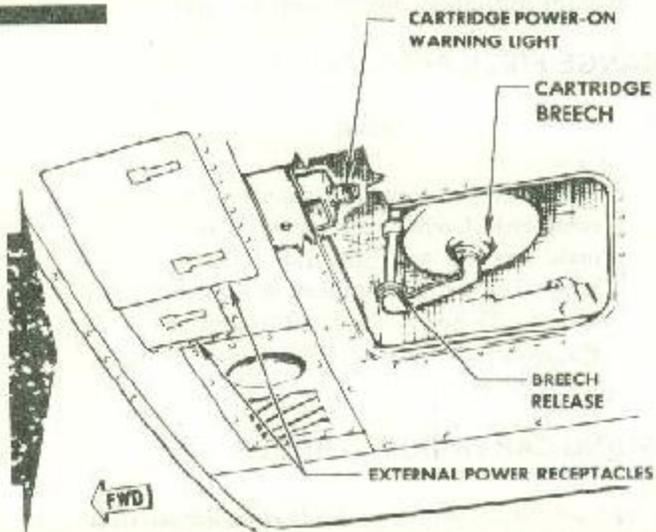
Your abbreviated checklist is in T.O. 1F-100D(I)-1CL-1.

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.

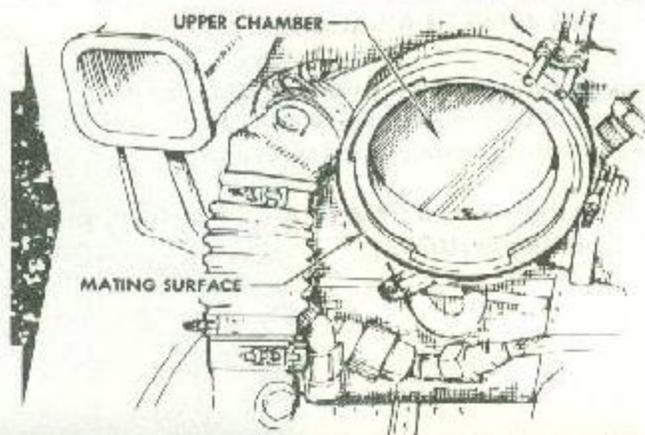


3. Clean deposits from upper cartridge chamber and around mating surface of chamber.
4. Remove cartridge from breech and clean inside of breech.

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.

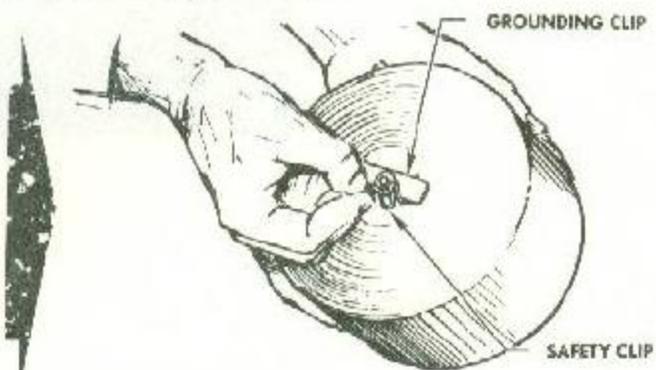
WARNING

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-A49-2A

Figure 2-8



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DEFINITIONS

CRITICAL PROCEDURE – A critical procedure is an emergency that must be performed immediately without reference to printed checklists and which must be committed to memory. These procedures are presented in capitalized **BOLDFACE** type.

JETTISON AS REQUIRED – If in the judgment of the pilot, aircraft handling characteristics are marginal or compromised due to external stores, tanks and external stores should be jettisoned. Normally, empty drop tanks do not adversely affect aircraft handling characteristics and may be retained.

LAND AS SOON AS POSSIBLE – Land the aircraft without delay. Aircraft gross weight may be reduced by jettisoning external stores. An emergency should be declared and a landing should then be accomplished at the nearest suitable airfield.

LAND AS SOON AS PRACTICAL – Aircraft gross weight may be reduced by burning out fuel. A landing can then be accomplished as soon as desired landing gross weight is reached or at any time thereafter.

INTRODUCTION

The outline presented in this section is divided into four sections – **GROUND OPERATIONS, TAKEOFF, IN-FLIGHT** and **LANDING**. The major portion is set up in alphabetical sequence except where chronological order fits various emergencies.

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. A pilot with a thorough knowledge of these procedures will be better able to cope with the problems encountered. 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 checklist except as a cleanup reference. Even though the procedures in this section are considered the best possible, the pilot must use sound

judgment when confronted with multiple emergencies, adverse weather, terrain clearance, etc. However, the following basic rules apply to all aircraft emergencies and should be thoroughly understood by all aircrews:

1. Maintain aircraft control.
2. Analyze the situation and take proper action.
3. Land as soon as practicable.

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

GROUND EMERGENCIES

ENGINE FIRE DURING STARTING.

If a fire- or overheat-warning light come 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. Fuel system shutoff switch – OFF.
4. Engine master switch – OFF.
5. Battery switch – OFF.

CAUTION

Turn fuel system shutoff switch OFF before battery switch is turned OFF, so that battery power is available to close the fuel system shutoff valve.

6. Leave airplane.

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.

GROUND ESCAPE.**EMERGENCY ENTRANCE.**

See figures 3-1 and 3-2.

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, using the ALTERNATE EMERGENCY JETTISON HANDLE.

WARNING

Use the canopy alternate emergency jettison handle to jettison canopy on aircraft equipped with single motion ejection seat. Raising handgrips to jettison canopy will eject the seat.

- If canopy has been partially opened (more than 4 inches **D**, or 8 inches **F** at the forward canopy bow), do not use the external emergency jettison handle, or the alternate emergency jettison handle. The canopy may not be removed, and injury or fire may be caused by the canopy remover.

EMERGENCY EVACUATION.

If time is critical or fire exists, proceed as follows:

1. SAFETY BELT – OPEN.

- a. Normal
- b. Jettison
- c. Canopy breaker tool

2. SURVIVAL KIT – DISCONNECT.**3. CANOPY – JETTISON.****4. ABANDON AIRCRAFT.**

Slide over cockpit rail on the side of the aircraft which is away from the fire or exit over the nose of the aircraft.

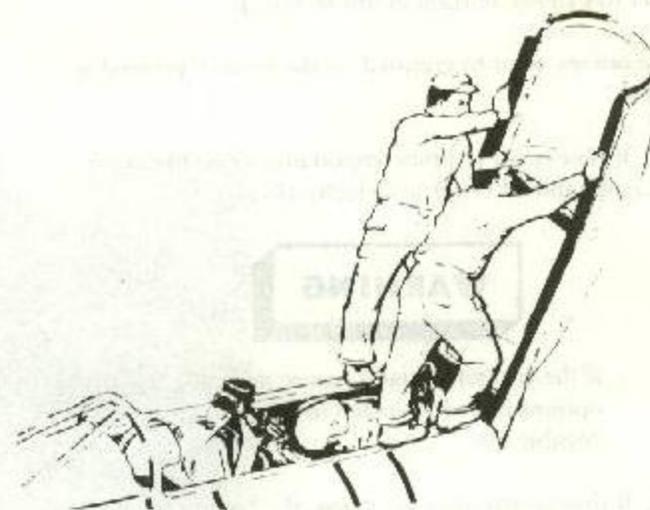
If time is not critical and there is no evidence of fire, proceed as follows:

1. Seat pin – Install.
2. Safety belt – Open.
3. Personal leads survival kit and parachute – Remove.
4. Canopy – Open.
5. Abandon aircraft.

FAILURE OF CANOPY TO OPEN.**CANOPY BREAKAWAY TOOL.**

A canopy breakaway tool (figure 3-3) provides an emergency method of exit when all normal and emergency procedures for opening the canopy fail. The tool is a short knife blade and a heavy cylindrical handle. The blade is stowed in a metal scabbard, and the handle is

GROUND EMERGENCIES (Cont)

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 of figure 3-2.

NOTE

If canopy cannot be opened, use alternate emergency entrance ϕ 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, CO₂ may not be effective as a cooling agent to harden or crystallize the glass. Its use is recommended, however, as a final effort

ϕ F-100D-51 and later and F-100F Airplanes
 ∇ F-100F Airplanes

WARNING

Remain clear of canopy ejection path. Avoid unnecessary handling of canopy and seat ejection mechanism.

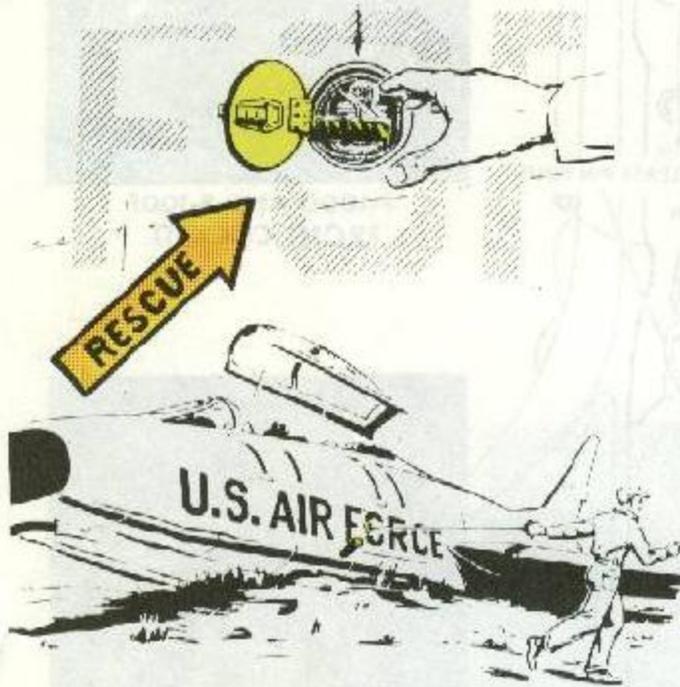
- Canopy opening by the explosive remover is considered an extreme emergency measure because of fire hazard. If the airplane is already on fire and time is of the utmost importance, or if fire-fighting equipment has arrived at the scene of the crash, the canopy may be jettisoned by the explosive remover.
- If canopy has been partially opened [more than 4 inches (8 inches ∇) at the forward canopy bow], do not use the alternate or external emergency jettison handle. The canopy may not be removed, and injury or fire may be caused by the canopy remover.

Figure 3-1

GROUND EMERGENCIES (Cont)

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

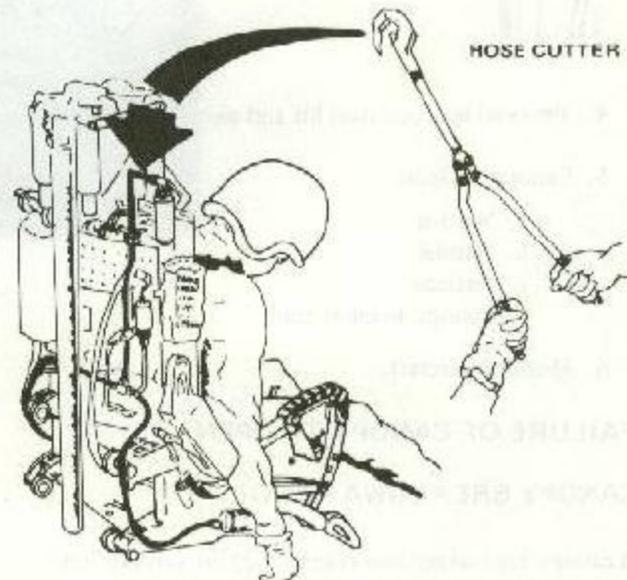
Keep all personnel clear of canopy ejection path. Watch canopy path after ejection and remain clear.

3 SINGLE MOTION EJECTION SEAT

If pilot jettisoned canopy in preparation for crash landing, the canopy alternate emergency jettison handle will be pulled. **DO NOT RAISE EITHER HANDGRIP.** (Raising either handgrip will eject seat.)

4 Disarm seat catapult by cutting or disconnecting** hose leading from the initiator on top right side of seat, located on bracket attached to armor plate, or cut yellow hose between catapult initiator (M-26) and the rocket catapult. Make sure loose ends are not aligned; otherwise, if the seat actuators fire accidentally expanding gases may actuate seat catapult causing seat to eject.

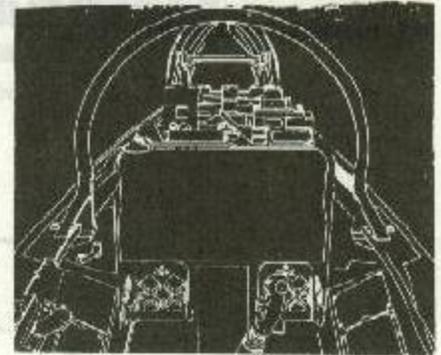
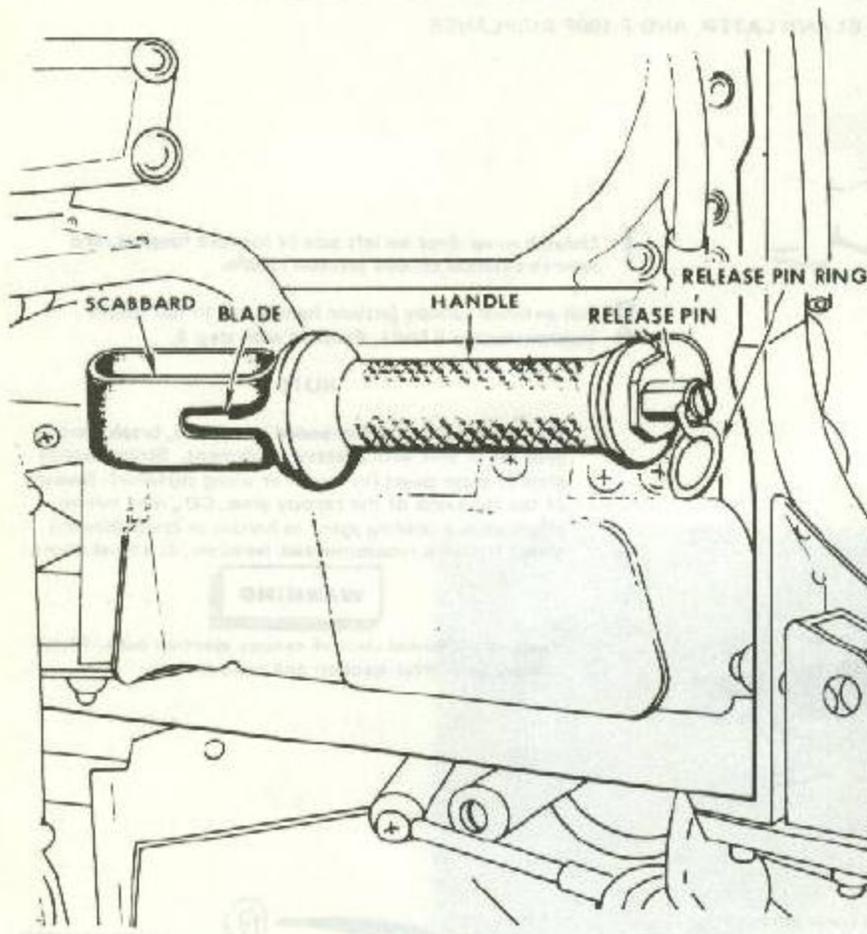
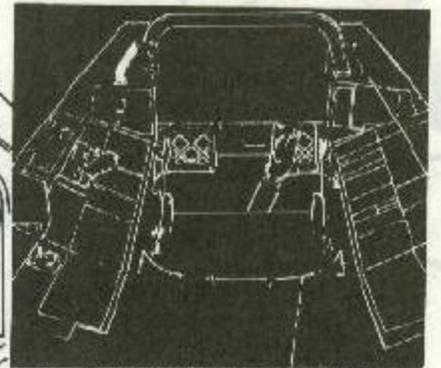
If handgrips are down **DO NOT RAISE.** (Handgrips are interconnected, raising one will eject seat). If time permits, install safety pins.



**USE 9/16 INCH OPEN-END WRENCH

Figure 3-2

GROUND EMERGENCIES (Cont)

CANOPY BREAKAWAY TOOLF-100D AND F-100F
FRONT COCKPIT

F-100F REAR COCKPIT

4. Personal leads, survival kit and parachute - Remove.
5. Canopy - Open.
 - a. Normal
 - b. Manual
 - c. Jettison
 - d. Canopy breaker tool
6. Abandon aircraft.

FAILURE OF CANOPY TO OPEN.**CANOPY BREAKAWAY TOOL.**

A canopy breakaway tool (figure 3-3) provides an emergency method of exit when all normal and emergency procedures for opening the canopy fail. The tool is a short knife blade and a heavy cylindrical handle. The blade is stowed in a metal scabbard, and the handle is

supported by a bracket and a release pin with a pull-ring. The tool can be removed by grasping the handle with one hand and pulling the release-pin ring with the other hand.

If the normal or emergency procedures for opening or removing the canopy fail, proceed as follows:

1. Remove canopy breakaway tool from scabbard by grasping handle of tool with one hand and pulling release-pin ring with other hand.
2. Grasp canopy breakaway tool in one hand firmly with cutting edge facing aft.
3. Grasp bottom end of tool handle with other hand so that bottom of handle rests against palm of hand.

TAKEOFF EMERGENCIES

4. Aim blade point to strike perpendicular to canopy surface, using body motion in upward thrusts.

NOTE

The blade of the tool should penetrate through the canopy and produce cracks leading away from the penetration point. Approximately four blows, placed so that the cracks from previous blows intercept, are necessary to open a hole large enough for escape. The approximate time to open an escape hole is 5 to 10 seconds.

ABORT/BARRIER/ARRESTING GEAR 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 (OFF FOR FIRE).

2. ARRESTING HOOK — RELEASE. The arresting hook should be released approximately 2000 feet before the cable to allow hook bounce to dampen. The arresting hook should be released for all types of engagements. Engage the barrier/arresting gear squarely in the center of the runway. Care should be taken to avoid braking while crossing the cable. If the engine has been shut down before engagement, and time and conditions permit, raise the wing flaps and turn the engine master, fuel system shutoff and battery switches OFF. Use wheel brakes cautiously, to maintain directional control, as nose wheel steering and antiskid will not be available without utility pressure and primary bus power. If an MA-1A type barrier is to be engaged, retard the throttle to OFF just before engagement and apply brakes after engaging the barrier.

WARNING

If the canopy has been lost and a barrier engagement of an MA-1A or modified MA-1A barrier is imminent, with any landing gear configuration other than all gears 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. All external stores, centerline pylons, and missile pylons or launchers must be jettisoned if an MA-1A barrier is to be engaged, as the prone cable striking these loads can be deflected under the main gear tires. Tests using an arresting hook and a modified MA-1A (with supported cable) were successful for speeds up to 150 knots IAS.

The BAK-6 arresting gear has a maximum engaging speed of 160 knots IAS regardless of airplane weight.

The BAK-9, BAK-12 and BAK-13 arresting gear will successfully arrest a near maximum weight F-100 Airplane at speeds up to 170 knots IAS.

WARNING

If the airplane is stopped with the engine running and the tail hook extended, do not place the throttle at OFF until the fire-fighting equipment has arrived and/or tail hook has cooled. This action will decrease the possibility of igniting fuel dumped during engine shutdown.

CAUTION

Arresting cables may be damaged by the wheel rims of aircraft with blown tires. In instances where wheels are locked, the damage to the cable is more severe and cable failure is probable.

3. DRAG CHUTE — DEPLOY.

4. SPEED BRAKE — UP.

5. LOAD — JETTISON (if necessary).

a. If there is no arresting gear or only an MA-1 type barrier is available, jettison external loads.

b. In the event of a runway emergency, carry loaded TER's into the barrier. The External Load Emergency Jettison Handle can be used to jettison drop tanks and stores loaded "low blow"

TAKEOFF EMERGENCIES (Cont)

AFTERBURNER FAILURE.

AFTERBURNER FAILURE DURING TAKEOFF.

1. ABORT.

If barrier engagement/arrestment is not feasible, or the landing gear handle has been raised, proceed as follows:

1. **THROTTLE – INBOARD.** 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.

- Inadvertant drag chute deployment may be mistaken for an afterburner failure. This condition would be indicated by an apparent loss of thrust while the EPR remains steady.

CAUTION

If the afterburner has failed, do not attempt to relight.

2. **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 takeoff can be successfully completed in Military Thrust.

ENGINE FAILURE.

ENGINE FAILURE DURING TAKEOFF.

1. **ABORT.** If engine failure occurs on takeoff before the landing gear handle is raised and a barrier engagement/arrestment is feasible, abort.

If barrier engagement/arrestment is not feasible or the landing gear handle has been raised, proceed as follows:

1. **LOAD – JETTISON.**2. **ZOOM AND EJECT.****WARNING**

Any upward vector with wings level will increase changes of survival.

ILLUMINATION OF THE FUEL VALVE FAIL LIGHT.

Steady or flickering illumination of the fuel valve fail light indicates a failure or impending failure of the fuel system shutoff valve, the light system circuitry, or a component of the system. If this light comes on during takeoff, action is required. The exact procedure to follow varies with each set of circumstances and depends upon ground speed, length of runway, overrun remaining, etc. The following procedures are recommended as guidance in making a decision.

TAKEOFF EMERGENCIES (Cont)

1. ABORT. If the fuel valve fail light illuminates steadily or flickers during ground roll, and sufficient runway or overrun is available, abort the takeoff.

If the fuel valve fail light illuminates steadily or flickers during takeoff and it is not feasible to abort, the following is recommended:

1. Continue takeoff.
2. Land as soon as possible. Do not cycle the fuel system shutoff switch. Cycling the switch may cause the fuel system shutoff valve to close and, if a failure has occurred, it may not reopen. This will cause a flame-out and restart will not be possible.

FIRE DURING TAKEOFF.

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 takeoff, 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 following procedures are recommended as a guide in making a decision.

1. ABORT. If the fire- or overheat-warning light comes on during ground roll, and sufficient runway or overrun is available, abort the takeoff.

If the fire- or overheat-warning light comes on after the airplane is airborne and it is not feasible to abort the takeoff, the following is recommended:

1. **THROTTLE – MAINTAIN TAKEOFF THRUST TO SAFE EJECTION ALTITUDE.**
2. **EXTERNAL LOAD – JETTISON (if necessary).**
3. **IF ON FIRE – EJECT.** 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.
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 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.

TIRE FAILURE DURING TAKEOFF.**MAIN GEAR.**

Tire failure on takeoff may present more problems than 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 takeoff should be continued rather than aborted. If main gear tire failure occurs during takeoff, the following instructions must be observed:

SPEED IS LESS THAN 150 KNOTS IAS:

1. **ABORT.**
2. **ANTISKID SWITCH – OFF.**

SPEED IS GREATER THAN 150 KNOTS IAS:

1. **CONTINUE TAKEOFF.**
2. **EXTERNAL LOAD – JETTISON (if necessary).**
3. **DO NOT RETRACT GEAR.**

WARNING

If takeoff 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 to be 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.

TAKEOFF EMERGENCIES (Cont)

NOSE GEAR.

Nose gear tire failure is serious if either tire fails on the takeoff 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 takeoff run and if speed is too slow to continue takeoff, the takeoff should be aborted.

NOTE

If nose gear tire failure occurs at or near nose rotation speed, the pilot may elect

to continue the takeoff 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.

IN-FLIGHT EMERGENCIES

AIR START.

IMMEDIATE RESTART.

WARNING

If a flame-out occurs when the aircraft is in landing configuration at less than 2,000 feet above the terrain, EJECT if the landing is not assured. DO NOT under any circumstances attempt an airstart below 2,000 feet. Refer to "Decision to Eject," and "Engine Failure During Flight at Low Altitude" in this section for additional information.

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 PROCEDURES.

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

IN-FLIGHT EMERGENCIES (Cont)

be made on the emergency fuel control system. See figure 3-4 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 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.

AIRSPEED AND ALTITUDE FOR ENGINE AIR START

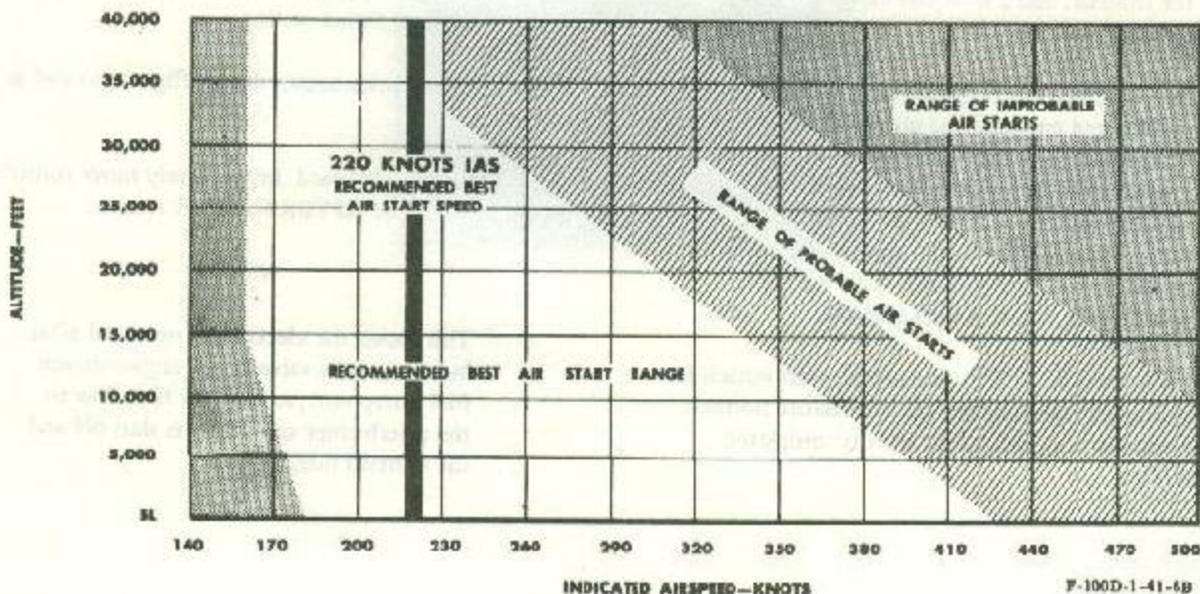


Figure 3-4

IN-FLIGHT EMERGENCIES (Cont)

- The standby 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, stay on the emergency system and land as soon as possible.

NOTE

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

- Successful air starts can be made with an undamaged engine if the airspeed-altitude combinations in figure 3-4 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 idle).

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. Ignition circuit breaker — Check in.
2. 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.
3. If air start unsuccessful — Eject.

AFTERBURNER FAILURE.**AFTERBURNER FAILURE 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 shuttle 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.

IN-FLIGHT EMERGENCIES (Cont)

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 indications 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 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.

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 conditions 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.

AFTERBURNER SHUTOFF SYSTEM FAILURE.

The afterburner emergency shutoff system shuts down the afterburner system mechanically if the electrical control system fails. The afterburner is shut off mechanically when the throttle is moved out of AFTERBURNER range and then retarded to approximately 82%. After afterburner shutoff occurs the throttle may then be advanced to approximately 89% without re-engaging the afterburner. The approximately 89% rpm non-afterburner thrust will be sufficient to return to a safe landing area. If additional thrust is needed for short periods, the use of full afterburner is recommended.

NOTE

If afterburner engages when the throttle is readvanced, note rpm at which afterburner engaged. Retard throttle again to disengage afterburner and then readvance throttle to an rpm less than that at which afterburner engages.

Military Thrust or less can be obtained from the combined engine and afterburner thrust with a throttle setting just above the emergency afterburner shutoff. However, operating at this thrust condition results in excessive fuel consumption for thrust output.

IN-FLIGHT EMERGENCIES (Cont)

CANOPY.

CANOPY JETTISON.

During an emergency when the canopy must be jettisoned, but ejection is not contemplated, the canopy alternate emergency jettison handle must be used. (See figure 3-5.) Before jettisoning canopy, pull helmet visor down.

WARNING

Do not raise either seat handgrip to jettison canopy. Raising either handgrip will eject one or both (F-100F Airplanes) seats.

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 afford 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

CANOPY JETTISON (ALTERNATE HANDLE)

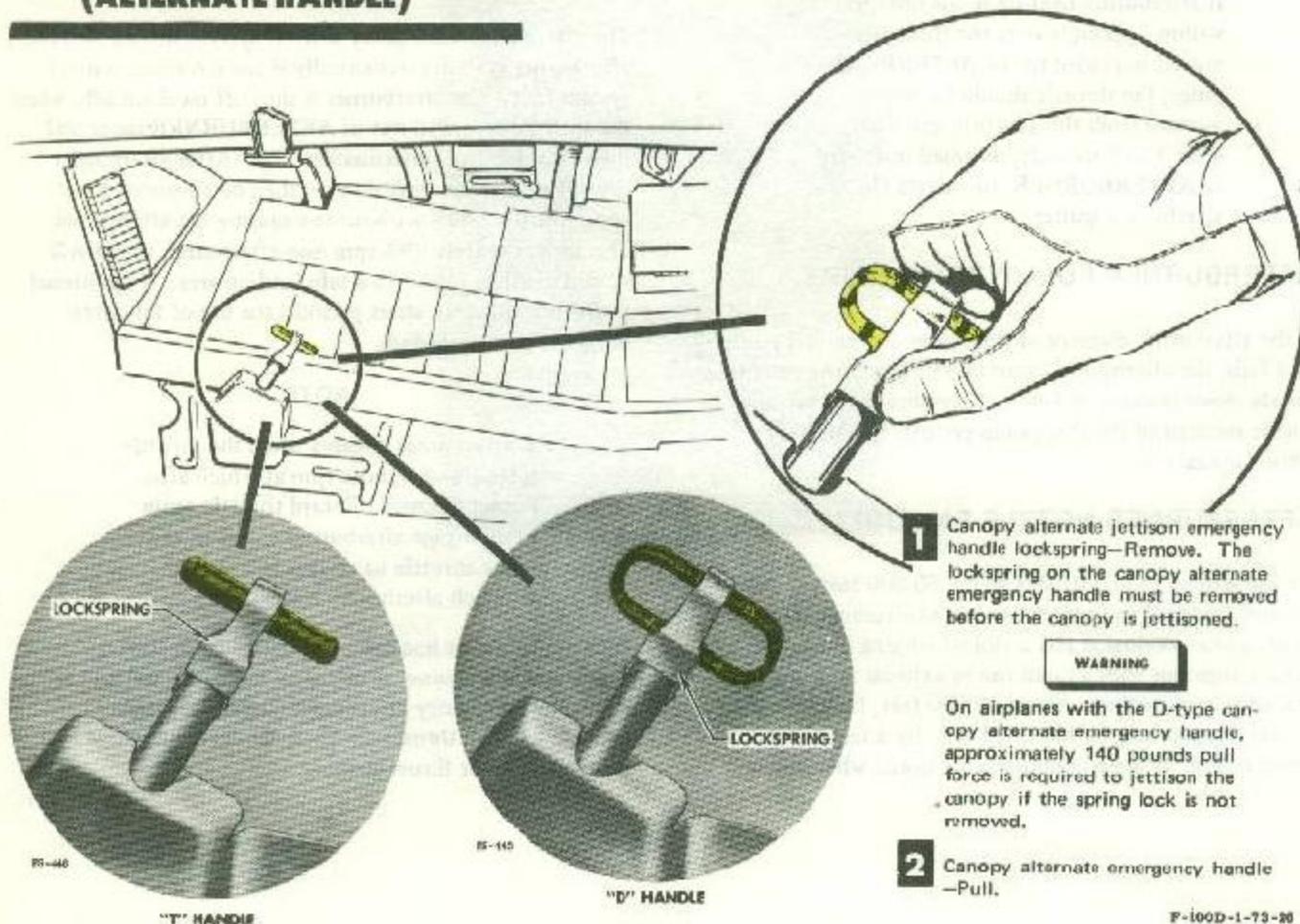


Figure 3-5

IN-FLIGHT EMERGENCIES (Cont)

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.

NOTE

F If the canopy must be jettisoned by use of the alternate handle the jettison should be initiated by the rear seat occupant. Use of the front seat T-handle will cause the rear seat BPIR to fire forcing the rear seat occupant into the ejection (upright) position.

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, causing the eyes to water even with the helmet visor down. Leaning forward in the cockpit reduces discomforting conditions. 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 subjected to continued flight at higher than recommended speeds.

NOTE

F If the canopy bubble is broken or fails, pulling the windscreen manual emergency release knob will raise the windscreen and afford the rear seat occupant some protection.

- 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 can be improved by turning the radio volume control to maximum and the cockpit pressure selector switch to "OFF".

DURING SOLO FLIGHT.

If canopy loss occurs in flight while only the front cockpit is occupied, proceed as follows:

1. Airspeed – Reduce as necessary.
2. Command radio volume control knob – Maximum. Turn to maximum volume to improve reception.
3. Cockpit pressure selector switch – OFF.
4. 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. AIRSPEED – REDUCE IMMEDIATELY TO BELOW 225 KNOTS IAS. Reduce airspeed immediately to prevent possible injury to the rear cockpit occupant.
2. Windscreen manual emergency release knob – Pull.
3. Command radio volume control knob – Maximum. Turn to maximum volume to improve reception.
4. Cockpit pressure selector switch – OFF.
5. Land as soon as possible. Use normal final approach and touchdown speeds for the weight and configuration being flown.

IN-FLIGHT EMERGENCIES (Cont)

CANOPY-NOT-LOCKED LIGHT ON INFLIGHT.

1. Do not operate canopy switch.
2. Land as soon as practical.

EJECTION.

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- to 1-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 3-6.

The following information should be observed, when ejection must be accomplished:

1. Under level flight conditions, eject at least 2000 feet above the terrain whenever possible.
2. Under spin or dive conditions, eject at least 10,000 feet above the terrain whenever possible.
3. Attempt to slow the airplane as much as practical before ejection by trading airspeed for altitude.
4. 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 medium forces on the body up to 450 knots IAS, severe forces causing flailing and skin injuries between 450 to 600 knots IAS, and excessive forces above 600 knots IAS. As altitude is increased, these speed ranges will be proportionately lower.

"Altitude above you is like runway behind you."



F-100D-1-D-100A

5. The automatic-opening safety belt must not be opened manually before ejection, regardless of altitude. The belt will open within 1 second after the seat ejects. If the belt is opened manually, seat separation will be too rapid at high speeds and the automatic-opening feature of the parachute is eliminated. This would require the parachute to be opened by use of the parachute arming lanyard or the ripcord handle.

LOW-ALTITUDE EJECTION.

During any low-altitude ejection, the chances for successful ejection can be greatly increased by zooming the airplane (if airspeed permits). Ejection should be accomplished while the airplane is in a positive climb. This will result in a more vertical trajectory for the seat and crew member, 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 zoom-up maneuver.)

IN-FLIGHT EMERGENCIES (Cont) SEAT EJECTION WITH DART/SNUBBING SYSTEM

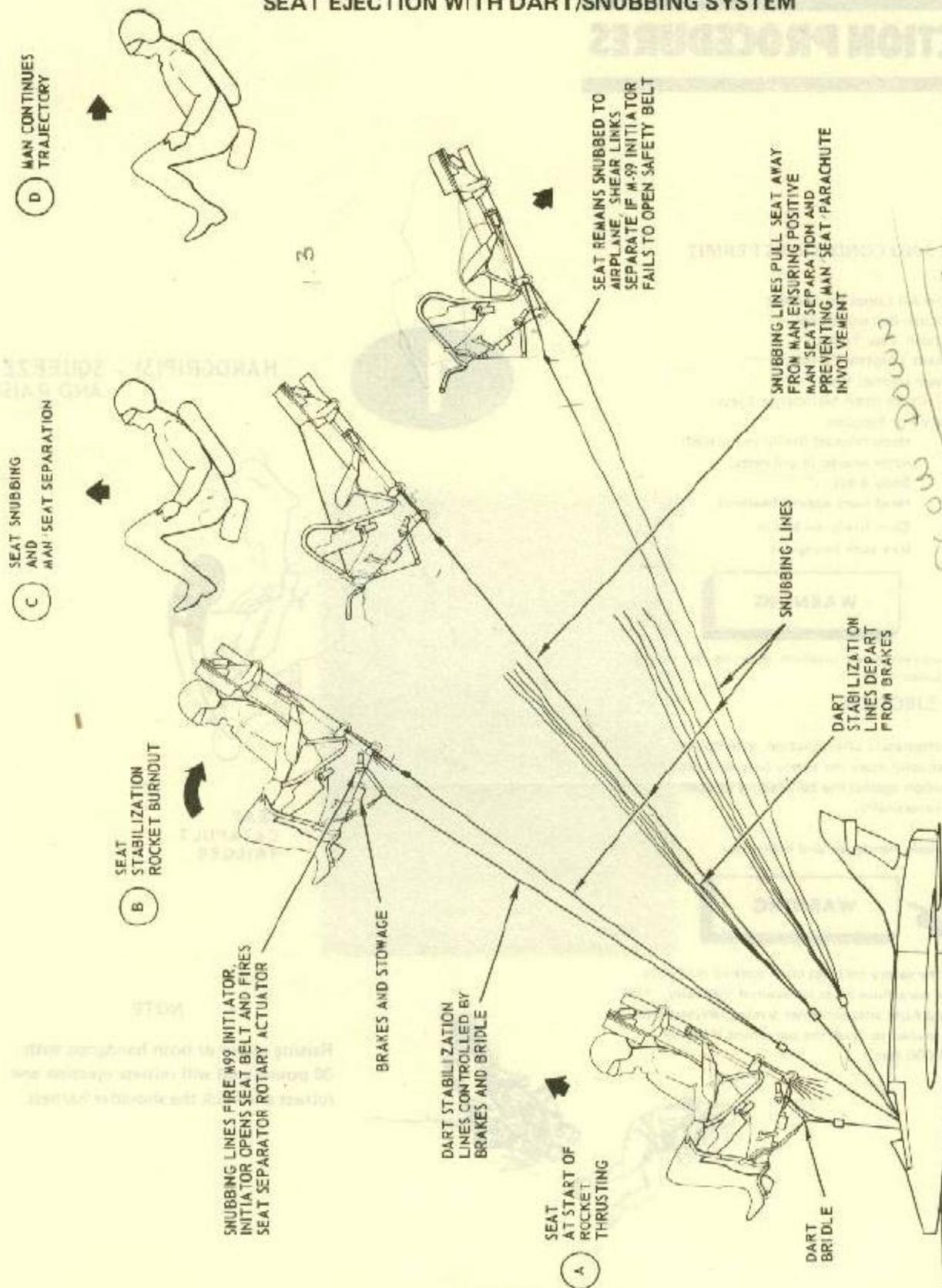


Figure 3-6 (Sheet 1 of 2)

EJECTION PROCEDURES

IF TIME AND CONDITIONS PERMIT

1. Stow All Loose Equipment
2. Actuate Ball-out Bottle -
3. Jettison Tow Target
4. Retard Throttle To Idle
5. Lower Helmet Visor
6. Order Crew Member to Eject
7. Brace For Ejection
 - Heels hooked firmly in footrest
 - Arms braced in armrests
 - Body erect
 - Head hard against headrest
 - Chin firmly tucked in
 - Use both handgrips

WARNING

Incorrect body position may cause severe injuries.

AFTER EJECTION

- Immediately after ejection, attempt to manually open the safety belt, as a precaution against the belt failing to open automatically.
- Release handgrips and kick free.

WARNING

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

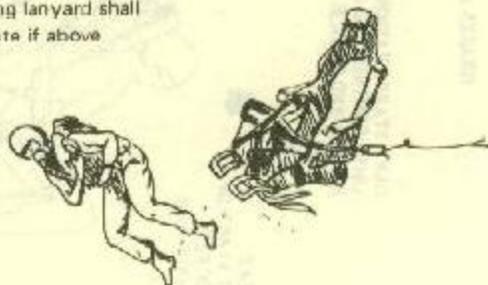


Figure 3-6 (Sheet 2 of 2)

1

HANDGRIP(S) - SQUEEZE AND RAISE



SEAT
CATAPULT
TRIGGER

NOTE

Raising either or both handgrips with 30 pound pull will initiate ejection and retract and lock the shoulder harness.

IN-FLIGHT EMERGENCIES (Cont)

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. Factors such as G-loads, high sink rate, and airplane attitudes other than level or slightly nose-high will decrease chances for survival.

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 takeoff. 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.

- The minimum ejection altitudes (minimum terrain clearance) are depicted in figure 3-7 for F-100D, and figure 3-8 for F-100F, and crew member reaction time is not considered. The curves do not provide any safety factor for incidents such as equipment malfunctions, delays in seat separation, or cartridge actuated devices. The performance capability shown, therefore, should not be considered absolute, but instead, as a general indication of the performance to be expected at the various conditions presented.

NOTE

The charts also are applicable to unmodified aircraft with the ZERO DELAY connected.

Ballistic Rocket Ejection Seat Catapult.

1. The emergency minimum ejection conditions, based on a level attitude and use of the Stencel parachute, are as follows:

- a. Zero Altitude and ¹⁵⁰120 knots IAS minimum.

2. The emergency minimum ejection conditions, based on a level attitude and use of the BA-22 parachute, are as follows:

- a. Zero-delay lanyard hook connected, zero altitude, 120 knots IAS minimum.

Zero-Delay Lanyard Connection Requirements.

Zero-delay lanyard hook connection is applicable only when not using the Stencel parachute. The zero-delay lanyard hook will be connected to the parachute ripcord handle as follows:

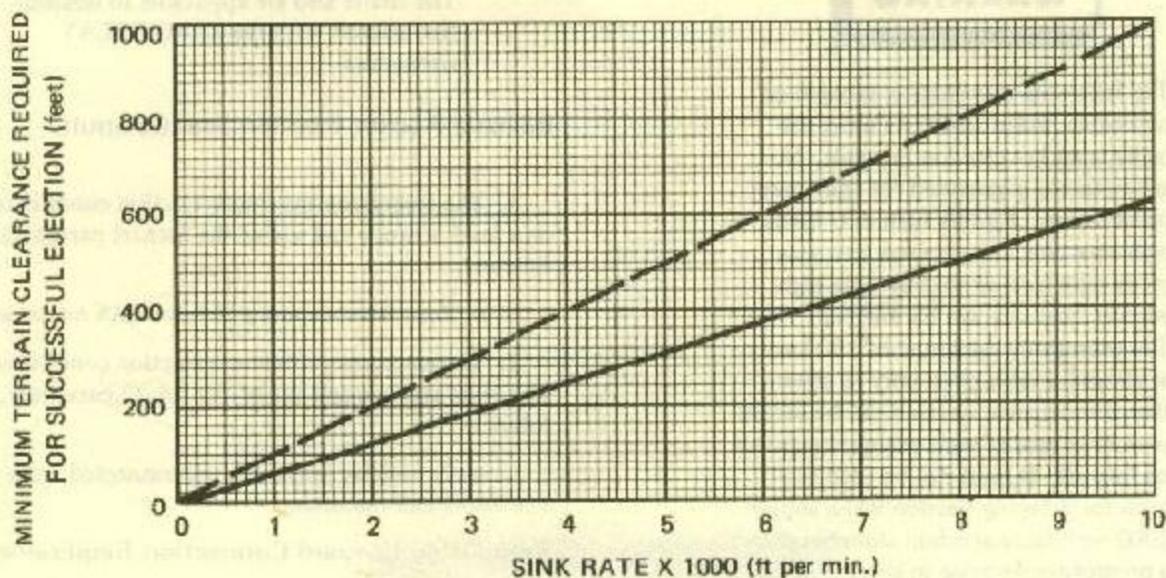
1. Before all takeoffs.
2. During all flights at less than 350 KIAS and altitude below 10,000 feet or 2,000 feet above the terrain, whichever is higher.
3. When ejecting under controlled conditions and at more than 2000 feet above the ground, disconnect the zero-delay lanyard.

WARNING

Do not attempt to connect zero-delay lanyard after deciding to eject.

IN-FLIGHT EMERGENCIES (Cont)

MINIMUM EJECTION ALTITUDE VS. AIRPLANE SINK RATE — F-100D



NOTES:

1. Airspeed: 100 to 150 knots indicated.
2. Pilot weight: 285 lb fully equipped.
3. Level flight and zero reaction time.
4. ——— Modified by T.O. 1F-100-1056, "DART and Snubber" System, and T.O. 1F-100-1064, "Single Motion."
5. - - - - Unmodified system: Dual Motion with zero delay lanyard connected.

Figure 3-7 (Sheet 1 of 3)

IF SEAT FAILS TO EJECT.

If seat does not eject when handgrips are squeezed and raised, proceed as follows:

1. Bail-out bottle — Actuate.
2. Personal leads — Disconnect.
3. Jettison canopy by using one of the following methods:
 - a. Pull canopy alternate emergency jettison handle.
 - b. Hold canopy switch at OPEN until canopy breaks away from airplane

- c. Use canopy internal manual emergency release handle to pull canopy aft so that air stream can break it free.

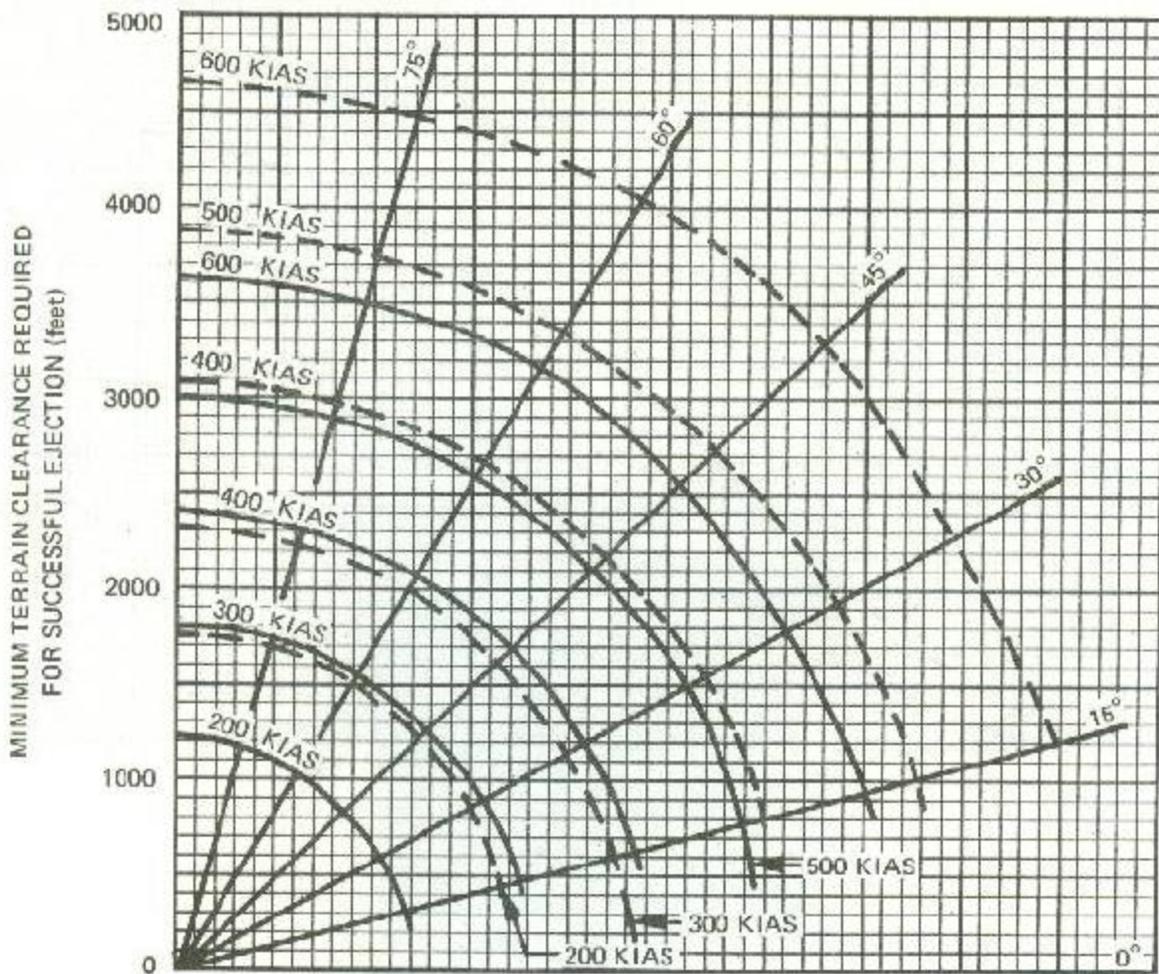
WARNING

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.

4. Trim — Nose down.

IN-FLIGHT EMERGENCIES (Cont)

MINIMUM EJECTION ALTITUDE VS. VELOCITY AND DIVE ANGLE - F-100D



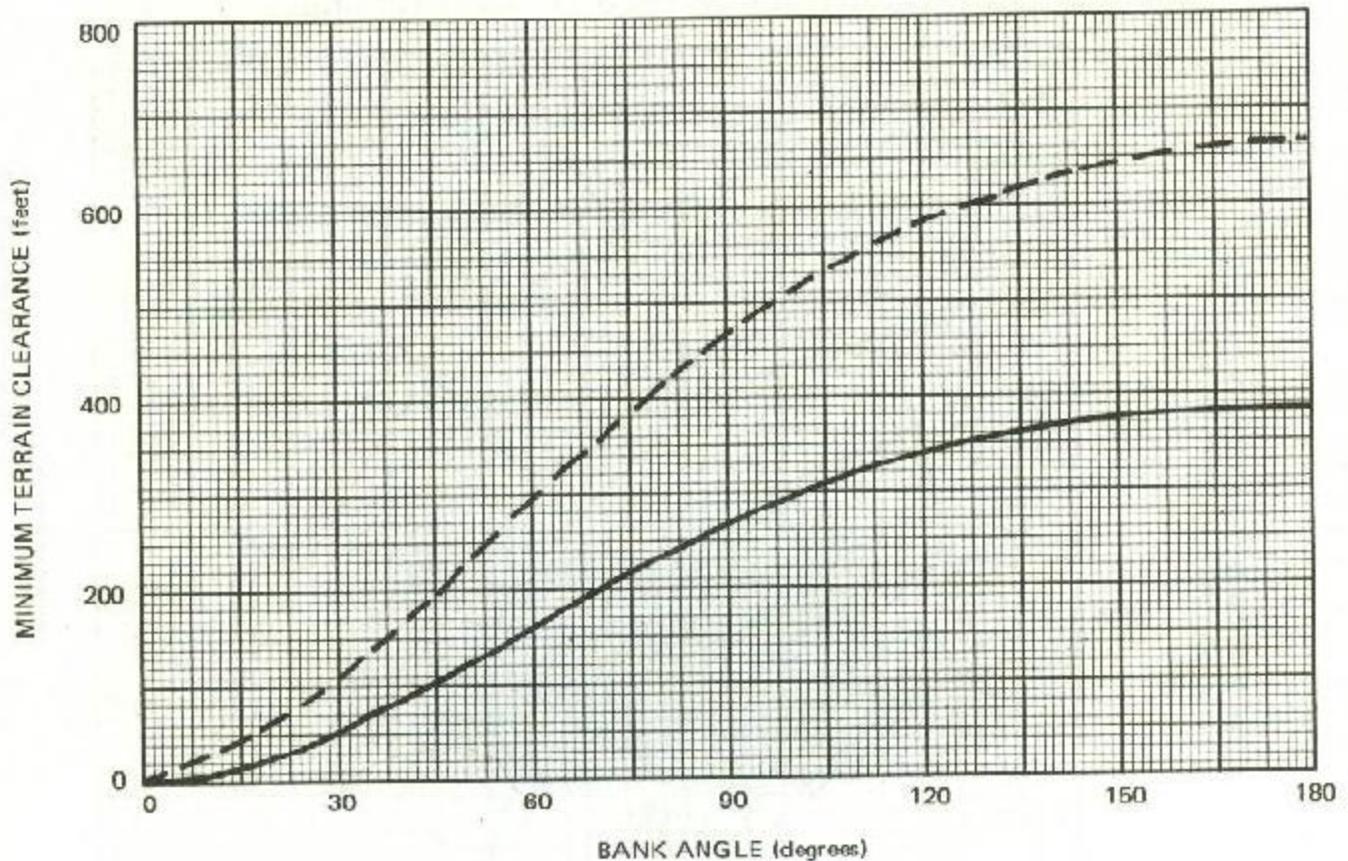
NOTES:

1. Wings level, Zero reaction time.
2. Pilot weight: 285 lb fully equipped.
3. ——— Modified by T.O. 1F-100-1056, "DART and Snubber" System, and T.O. 1F-100-1054, "Single Motion."
4. - - - - Unmodified system; Zero delay lanyard connected and dual motion.

Figure 3-7 (Sheet 2 of 3)

IN-FLIGHT EMERGENCIES (Cont)

BANK ANGLE VS. MINIMUM EJECTION ALTITUDE — F-100D



NOTES:

1. Airspeed 200 KIAS, altitude constant.
2. Zero reaction time.
3. ——— Aircraft modified by T.O. 1F-100-1056, "DART and Snubber" System, and T.O. 1F-100-1064, "Single Motion."
4. - - - - - Unmodified aircraft, dual motion and zero delay lanyard connected.

Figure 3-7 (Sheet 3 of 3)

5. Safety belt — Unfasten and release stick. If airplane is not controllable, slow airplane as much as possible and bail out over the side.

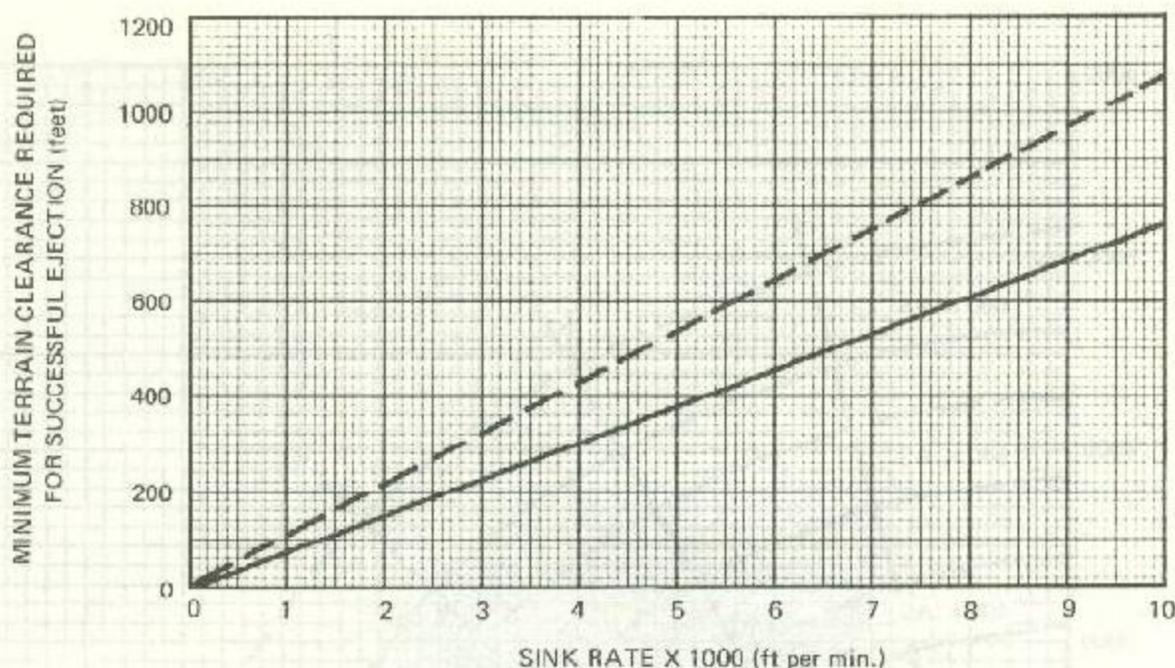
6. Parachute arming lanyard — Pull. If at low altitude, pull parachute ripcord handle.

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

IN-FLIGHT EMERGENCIES (Cont)

MINIMUM EJECTION ALTITUDE VS. AIRPLANE SINK RATE — F-100F



NOTES:

1. Airspeed: 100 to 150 knots indicated.
2. Pilots weight: Aft 285 lb fully equipped; fwd 220 lb fully equipped.
3. Level flight and zero reaction time.
4. Chart shows forward seat performance only, aft seat is assumed to have ejected.
5. ——— Modified by T.O. 1F-100-1056, "DART and Snubber" System and T.O. 1F-100-1064, "Single Motion," Forward seat ejects 1 second after rear seat.
6. - - - Unmodified system: Dual motion with zero delay lanyard connected and forward seat ejecting 0.5 second after rear seat.

Figure 3-8 (Sheet 1 of 3)

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.

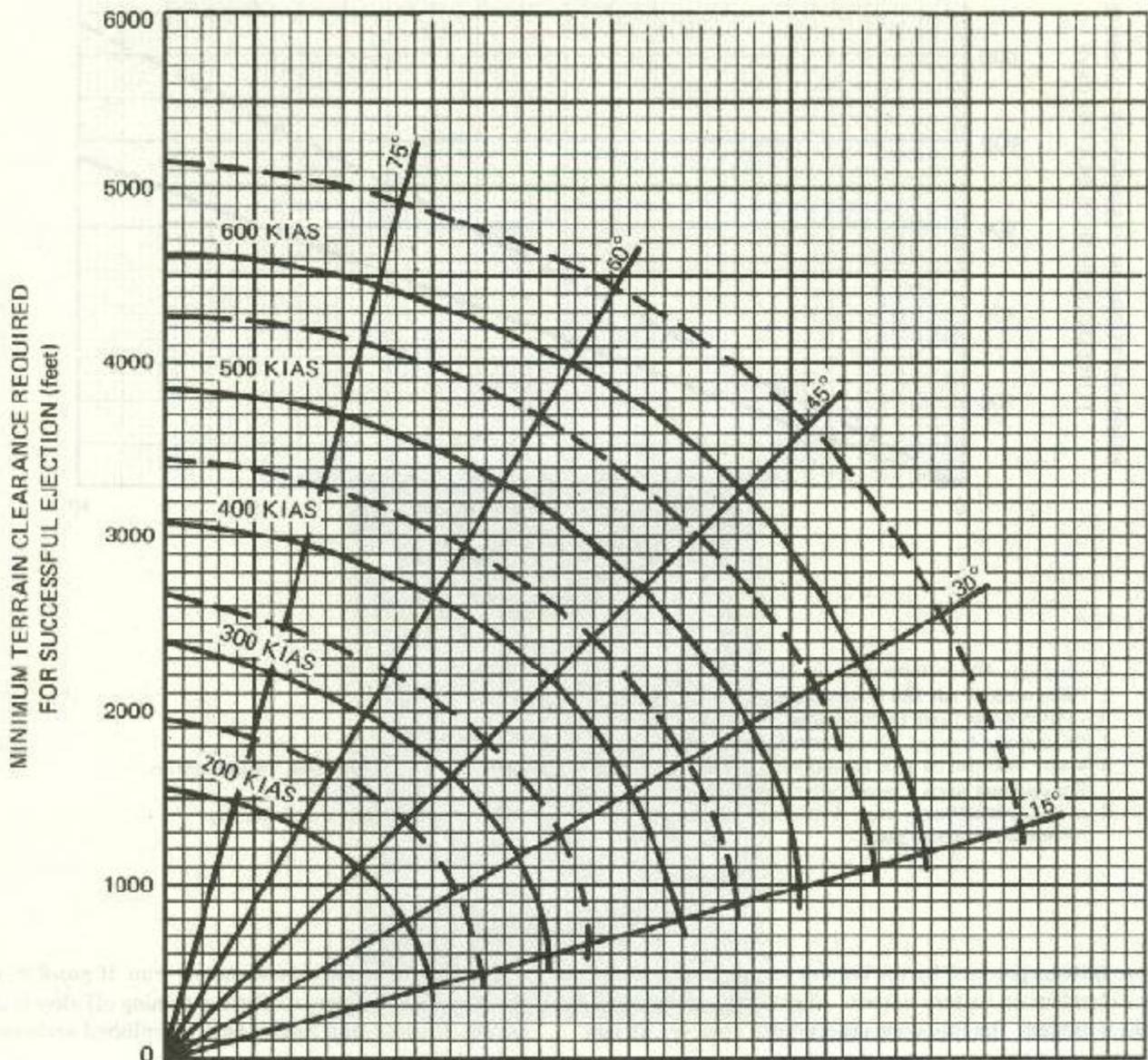
1. Reduce airspeed and readjust trim. If possible, reduce airspeed and readjust trim before turning off electrical power, because trim cannot be accomplished without electrical power.

2. Electrical power switches — 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

IN-FLIGHT EMERGENCIES (Cont)

MINIMUM EJECTION ALTITUDE VS. VELOCITY AND DIVE ANGLE – F-100F



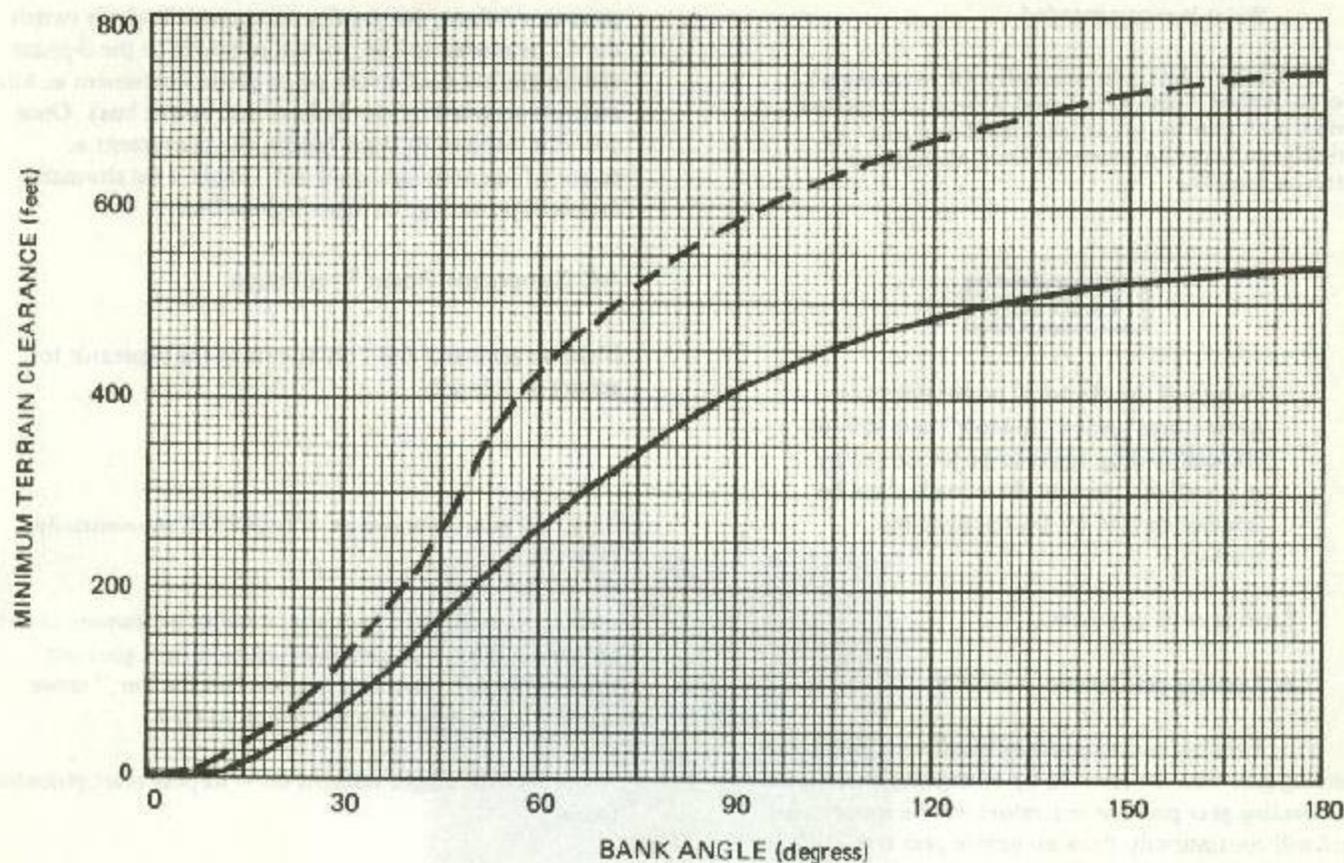
NOTES:

1. Wings level. Zero reaction time.
2. Pilots weight: Aft seat 285 lb fully equipped; fwd 220 lb fully equipped.
3. Chart shows front seat performance only, aft seat ejected by front seat.
4. ——— Modified by T.O. 1F-100-1056, "DART and Snubber" System and T.O. 1F-100-1064, "Single Motion." Front seat ejects 1 second after rear seat.
5. - - - - Unmodified system, zero delay lanyard connected. Front seat ejects 0.5 second after rear seat.

Figure 3-8 (Sheet 2 of 3)

IN-FLIGHT EMERGENCIES (Cont)

BANK ANGLE VS. MINIMUM EJECTION ALTITUDE — F-100F



NOTES:

1. Airspeed 200 KIAS, altitude constant.
2. Zero reaction time.
3. Chart shows front seat performance only, back seat ejected by front seat.
4. ——— Modified by T.O. 1F-100-1056, "DART and Snubber" System and T.O. 1F-100-1064, "Single Motion." The front seat ejects 1 second after the rear seat.
5. - - - Unmodified system, zero delay lanyard connected. Front seat ejects 0.5 second after rear seat.

Figure 3-8 (Sheet 3 of 3)

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 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 the afterburner, shut off afterburner by retarding the throttle to below the emergency afterburner shutoff (approximately 82%). This thrust setting may not sustain flight for the airplane load configuration and altitude. The afterburner can be shut off in the same manner; however, the throttle can be readvanced to approximately 89% rpm without reengaging the afterburner. If

IN-FLIGHT EMERGENCIES (Cont)

additional thrust is needed for short periods, the use of full afterburner thrust is recommended.

4. Load — Jettison manually (if necessary). Stores loaded "low-blow" and 335-or 275-gallon drop tanks can be jettisoned mechanically by quickly pulling the external load emergency jettison handle.

CAUTION

Failure of the electrical power does not allow stores loaded "hi-blow" and 450- 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.

a. Landing gear handle — DOWN.

b. Landing gear emergency handle — Pull. The landing gear must be lowered by emergency means, and the landing gear position indicators will be inoperative and will continuously show an unsafe gear condition.

c. With complete electrical failure flaps will not be available. Arresting gear engagement will not be available unless hook had been deployed prior to the complete electrical failure.

GENERATOR FAILURE.

AC Generator Failure.

Any actual generator failure or generator over-voltage 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.

1. STANDBY INVERTER — ON

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 standby 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. AC generator switch — To RESET momentarily; then ON.
2. If caution light goes out, standby instrument inverter switch — OFF. If ac generator caution light goes out, showing that ac generator is again "on the line," move standby instrument inverter switch to OFF.
3. 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 the generator light remains on after three reset attempts, assume that ac generator drive unit has failed. Proceed as follows:

4. AC generator switch — OFF.
5. Stabilize engine rpm.
6. Land as soon as practical.

IN-FLIGHT EMERGENCIES (Cont)

NOTE

Military Thrust is available below 40,000 feet 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.

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 tertiary 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. Since 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 the dc generator caution light comes 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 caution 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 tertiary bus by moving the bomb release mode selector switch to SIGHT & RADAR and checking sight reticle light and radar ranging operation (or instrument panel vibrator) to determine whether dc generator or caution light has malfunctioned. Then proceed to step 3.
3. If dc generator is normal (tertiary bus operation) — 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 tertiary bus is inoperative — Land as soon as practical.
 - a. DC generator switch — OFF.
 - b. DC loadmeter — Check.

IN-FLIGHT EMERGENCIES (Cont)

NOTE

If transformer-rectifier is powering dc equipment, reduce fuel load and land as soon as practical. If transformer-rectifier fails, reduce battery load and land as soon as practical.

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. If the fuel system shutoff valve fail light comes on in flight simultaneously with loss of power, it indicates the shutoff valve is partially closed. *Do not* cycle the fuel system shutoff switch. A landing should be made as soon as possible. If the light comes on in flight and a flame-out occurs, the throttle setting should be reduced and as a last resort cycle the fuel system shutoff switch in an attempt to open the valve and extinguish the light. Regardless of light indication, attempt an air start.

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 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 oil pressure, a successful air start is unlikely.

ENGINE FAILURE PROCEDURES.

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 ac 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. 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. Damper emergency disconnect lever – Press.
4. Glide – 220 knots IAS.
5. Nonessential electrical equipment – Off. Turn off all nonessential electrical equipment to reduce battery load.

CAUTION

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. If air start is not successful – Eject.

IN-FLIGHT EMERGENCIES (Cont)

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.).

WARNING

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. (It is recommended the pilot actuate back trim during zoom-up to prevent pitchover during ejection.) Hold this condition and eject while still in an upward vector. 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 distances 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.

FIRE OR EXPLOSION.

In case of a fire or explosion, the procedures in the following paragraphs should be accomplished. Determining the course of action 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 is encountered during afterburner operation.

- If fire or overheat is experienced or suspected, the yaw and pitch damper system will be disengaged. If the yaw damper system is not in use it will not be engaged.

FIRE DURING FLIGHT.

If the fire- or overheat-warning light comes on during flight, proceed as follows:

1. **THROTTLE - MINIMUM PRACTICAL POWER.** Maintain a safe ejection altitude.
2. **IF ON FIRE - EJECT.** Determine whether a fire actually exists by a report from another airplane, abnormal instrument readings, or airplane or engine response to

IN-FLIGHT EMERGENCIES (Cont)

controls, explosion, unusual noise or vibration, fumes, heat, cockpit smoke, or trailing smoke noted following a turn.

3. 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 controllability before descent below safe ejection altitude, and land as soon as possible.

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 GENERATORS — OFF (if practical).

WARNING

If an electrical fire occurs in instrument conditions, immediately turn off all electrical equipment that is not necessary for instrument flight and attempt to enter VFR conditions.

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.

FLIGHT CONTROLS.

FLIGHT CONTROL ARTIFICIAL-FEEL SYSTEM FAILURE.

The artificial-feel system failure can be indicated by a lightening of stick forces (resulting in over-control), 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.

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.

2. Land as soon as possible.

IN-FLIGHT EMERGENCIES (Cont)

During landing approach:

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. Emergency hydraulic pump lever (RAT) ON. The emergency pump will automatically come on when engine rpm drops below 40% rpm. Otherwise, it must be turned on manually. 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.

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.

6. Use minimum throttle movements.

CAUTION

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.

7. 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; therefore, an attempted landing under these circumstances must be considered extremely hazardous. When confronted with this type of malfunction, a controlled ejection is normally the best course of action due to the probability of encountering a null flow condition during the approach and landing. (Refer to Null Flow Section VII).

- 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.

IN-FLIGHT EMERGENCIES (Cont)

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.

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. Takeoff trim button — Press for takeoff trim. The takeoff 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 takeoff trim button should be used. The takeoff 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.

3. Pitch trim motor failure — In the event of motor failure, perform a stability check at landing speed with gear down and select an appropriate flap position to minimize control stick forces. A safe landing can be accomplished with intermediate flap configuration.

FUEL SYSTEM.

AIRPLANE FUEL SYSTEM FAILURE.

This fuel system transfers fuel so that no single pump failure above 25,000 feet will affect Military Thrust operation, as long as the forward tank gage indicates fuel. A pump failure is indicated when the forward tank/total quantity gage relationship shows an abnormal decrease in the forward tank gage reading at fuel flow rates less than 4000 pounds per hour. Refer to Fuel System Management in section VII.

EXCESSIVE FUEL FLOW.

If a higher than normal fuel depletion occurs check the following:

1. Throttle — Inboard, below 82%.
2. Visual Inspection — Check for leaks, AB eyelids open, etc.
3. Instruments — Check gauges for malfunction, indication of transfer problems.
4. Land as soon as possible.

IN-FLIGHT EMERGENCIES (Cont)

INFLIGHT OPERATION.

If the BOOST PUMP INOP light comes on, fuel pressure to the engine has dropped below 5 psi, probably as a result of failure of one or more boost pumps. The following actions should be taken to prevent flameout:

1. Terminate afterburner operation.

NOTE

Afterburner should not be used when fuel in forward tank is less than 250 pounds.

2. Descend to below 25,000 feet.

3. All aircraft maneuvers should be as gentle as possible keeping the aircraft loading as near as possible to 1G. Avoid steep (20 degrees or more) nose-down attitudes.

4. Land as soon as practical.

With fuel flows below 4000 pounds per hour, Military Thrust operation can be maintained above 25,000 feet with the most critical single pump failure, even though the forward tank gage approaches or indicates zero, provided the total quantity gage indicates 1700 pounds or more. Below 25,000 feet with the most critical pump failure, Military Thrust operation can be maintained as long as 600 pounds is indicated on the total quantity gage.

IN-FLIGHT EMERGENCIES (Cont)

NOTE

Above 25,000 feet a failure of the intermediate tank transfer pump is considered the most critical. Below 25,000 feet, the most critical failure is a wing tank scavenge pump.

- With a failure of the intermediate tank transfer pump, afterburner operation can be maintained above 25,000 feet when the total fuel remaining is above 3100 pounds.
- With a failure of a wing tank scavenge pump, afterburner operation can be maintained below 25,000 feet when total fuel remaining is above 1700 pounds.

If a flame-out occurs under these conditions, an air start should be attempted. It may be necessary to descend to below 25,000 feet to accomplish an air start.

CAUTION

If a flame-out is due to depletion of the fuel from the forward tank, the throttle should be left at IDLE, to allow fuel to be transferred to the forward tank.

NOTE

Transfer of fuel by gravity from the wing tank can be increased by decelerations, yaws, and slips.

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 de-energizes 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.

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 an 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.

IN-FLIGHT EMERGENCIES (Cont)

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, do not transfer back to normal system.
- If throttle response is not evident, a throttle linkage failure may have occurred. Refer to Throttle Failure in this section. Transfer to the normal fuel system may be accomplished in case of a linkage failure.

Engine Fuel Pump Failure.

If the engine element fails, the fuel regulating transfer valve in the pump unit opens and automatically sends the afterburner element output to the engine fuel control unit, and terminates afterburner operation.

Illumination of the Fuel Valve Fail Light.

Steady or flickering illumination of the fuel valve fail light indicates a failure or impending failure of the fuel system shutoff valve, the light system circuitry, or a component of the system. If this occurs, land the aircraft as soon as possible. *Do not* cycle the fuel system shutoff switch. Cycling the switch may cause the fuel system shutoff valve to close and, if a failure has occurred, it may not reopen. This will cause a flame-out and restart will not be possible.

HEAT AND VENT EMERGENCY.**EMERGENCY DEPRESSURIZATION (INTENTIONAL).**

1. Oxygen — 100%.
2. Descend to 25,000 feet or below, if circumstances permit.
3. Emergency ram-air lever* — Between CLOSED and OPEN.
4. Cockpit pressure selector switch — RAM AIR ON† (emergency ram-air lever* — OPEN), 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

IN-FLIGHT EMERGENCIES (Cont)

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 (UNINTENTIONAL).

If sudden depressurization occurs because of a sudden stoppage of airflow to the cockpit, proceed as follows:

1. Oxygen – 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 (RAM AIR ON†) 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. Oxygen – 100%.
2. Canopy and windshield defrost lever – DECREASE.

*F-100D-91 Airplanes and F-100F Airplanes

†F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes

‡Some airplanes

IN-FLIGHT EMERGENCIES (Cont)

3. Windshield exterior air switch – OFF.
4. Pitot heat switch – OFF.
5. Cockpit temperature rheostat – COLD.
6. Cockpit temperature master switch – COLD.
7. Anti-G suit – Check for excessively hot airflow.
8. If temperature is still uncomfortably high:
 - a. Cockpit pressure selector switch – RAM AIR ON,[†] or emergency ram-air lever * – OPEN or RAM PRESS.

NOTE

This can cause excessively high cockpit air temperature at low altitudes and high air-speed (especially at high outside air temperatures). Cockpit temperatures can be lowered by reducing airspeed and/or increasing altitude.

- b. Descend to 25,000 feet or below if circumstances permit.
9. 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.

*F-100D-86 Airplanes AF56-3407 through -3463, F-100D-91 Airplanes not changed by T.O. 1F-100D-651, and F-100F Airplanes

[†]F-100D Airplanes and F-100F-2 through F-100F-16 Airplanes

c. Canopy – Jettison if heat continues or if cockpit becomes hot enough to cause physical injury.

10. If cockpit heat cannot be reduced enough to continue safe flight:

- a. External load – Jettison if necessary.
- b. Land as soon as possible.

WARNING

Cooling turbine failure can occur without any symptoms other than loss of cockpit temperature control. Failure of the cooling turbine can cause extensive/catastrophic engine damage due to ingestion of turbine debris. If temperature control is lost, land as soon as possible.

HEAT AND VENT SYSTEM OVERHEATED.

If the heat and vent system overheat caution light comes on:

1. Oxygen – 100%.
2. Cockpit temperature rheostat – COLD, and if light does not go out, cockpit temperature master switch COLD.
3. Pitot heat, defrosting and anti-icing system – Turn OFF, if conditions permit.
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.

IN-FLIGHT EMERGENCIES (Cont)

5. Throttle – Retard to lower temperature of engine compressor bleed air.

6. Cockpit pressure selector switch – OFF, or RAM AIR ON, ϕ 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 \odot – EMER OFF, if light remains on. This shuts off all engine compressor bleed air. (The engine guide vane anti-icing system will continue operating.)

‡ F-100D-86 Airplanes AF56-3407 through -3463, F-100D-91 Airplanes not changed by T.O. 1F-100D-651, and F-100F Airplanes
 ϕ F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes.

IN-FLIGHT EMERGENCIES (Cont)

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.

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.

EQUIPMENT AIR OVERHEATED.**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 light comes on, proceed as follows:

NOTE

The equipment air overheat caution light stays on until ram-air temperature is reduced and airflow is increased for adequate cooling.

1. Cockpit temperature rheostat – Other than COLD or HI-FLO (F-100F Airplanes).
2. Windshield exterior air switch – OFF.
3. Defrost lever – Decrease.
4. Change altitude and/or airspeed.

CAUTION

When in level flight, if the equipment air overheat caution light comes on, it is possible that the aft electronic equipment cooling turbine (F-100F airplanes) 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.)

5. If equipment air overheat caution light remains 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.

†F-100D Airplanes and F-100F-2 through F-100F-16 Airplanes

IN-FLIGHT EMERGENCIES (Cont)

JETTISON OF EXTERNAL LOAD.

CAUTION

Failure of electrical power does not allow stores loaded "hi-blow" and 450- or 200-gallon drop tanks to be jettisoned by any method, because these loads must be forcibly ejected by electrically fired ejectors.

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 low-blow stores and 275/335-gallon drop tanks can be jettisoned. External loads (non-nuclear 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 low-blow stores and 275/335-gallon drop tanks.
3. Station selector switches* – JETT.
4. Armament selector switch – JETTISON ALL (PYLON JETT*) Press bomb button.
5. External load auxiliary release buttons – Press one at a time at intervals of one second or more.

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 stores loaded "low-blow", since they do not require the full force of the ejector cartridge for release.

NOTE

When using the auxiliary release buttons, external loads (conventional weapons) are released armed or safe (depending on the position of the bomb arming switch) and are force ejected, hi or low-blow for clean separation. 275/335-gallon drop tanks are gravity released. The pylons are not released by the auxiliary release buttons.

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.

*Airplanes changed by T.O. 1F-100D-632

IN-FLIGHT EMERGENCIES (Cont)

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 low-blow stores and 275/335-gallon drop tanks.
5. Station selector switches* — JETT.
6. Armament selector switch — JETTISON ALL (PYLON JETT*) — Press bomb button.
7. External load auxiliary release buttons — Press one at a time at intervals of one second or more.

CAUTION

Do not press more than one auxiliary release button at a time. The combined recoil of ejector cartridges for stores that require full force of the ejector cartridges produces stresses that can damage the wing structure. This does not include stores loaded "low-blow," since they do not require the full force of the ejector cartridge for release.

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 low-blow stores and 275/335-gallon drop tanks.
4. Station selector switches* — JETT.
5. Armament selector switch — JETTISON ALL (PYLON JETT*) — Press bomb button.
6. External load auxiliary release buttons — Press one at a time at intervals of one second or more.

*Airplanes changed by T.O. 1F-100D-632

IN-FLIGHT EMERGENCIES (Cont)

CAUTION

Do not press more than one auxiliary release button at a time. The combined recoil of ejector cartridges for stores that require full force of the ejector cartridges produces stresses that can damage the wing structure. This does not include stores loaded "low-blow," since they do not require the full force of the ejector cartridge for release.

JETTISON OF EXTERNAL LOAD WITH LANDING GEAR EXTENDED.

Results of a computerized study revealed the following conditions are encountered when external stores are jettisoned with the landing gear extended. The study did not consider yaw or pitching which could be introduced by turbulence, or erratic aircraft operation.

1. Outboard Station — All stores and pylons can be jettisoned without hitting the gear.
2. Intermediate Station — Stores loaded "LOW — BLOW," unfinned stores and pylons can be jettisoned without hitting the gear. Stores loaded "HIGH — BLOW" may graze the gear.
3. Inboard Station Without TER — Stores loaded "HIGH — BLOW," finned stores and pylons can be jettisoned without hitting the gear. Stores loaded "LOW — BLOW" and unfinned stores, full or empty, will hit the gear.
4. Inboard Station With TER — Jettisoning the outboard shoulder store from a TER or a TER with stores on the inboard and centerline stations will hit the gear. All other TER configurations will jettison without hitting the gear.

LANDING GEAR IN-FLIGHT UNSAFE INDICATION.

If a landing gear unsafe indication occurs in flight, proceed as follows:

1. Reduce airspeed to below 230 knots IAS.
2. Obtain visual check of gear and door position (if possible). Have a gear and door position check made by the tower on a fly-by, or by another airplane in flight.
3. Cycle gear. If unsafe indication remains after gear has been cycled, proceed to step 4.
4. Lower gear, and land.

WARNING

Whenever a gear malfunction occurs or an unsafe indication is observed while cycling the gear down, the gear will not be recycled after full down and locked indication is achieved by either normal or emergency means. Leave the gear down and land as soon as practical.

OIL SYSTEM FAILURE.

When an oil system failure is encountered, adjust throttle to minimum setting that will be required for continued flight and subsequent landing. Once the throttle has been set, additional throttle movements should be made only if absolutely necessary, as they could cause engine seizure.

NOTE

Additional thrust may be obtained by the use of afterburner if the minimum setting being used is within the extended afterburner range.

ENGINE OIL OVERHEAT.

The oil temperature regulator has a thermal lag that 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). Oil temperature above 127°C (260°F), under certain operating conditions, such as shortly after takeoff or after a thrust reduction, may result in the engine oil overheat caution light to blink or flash. This is considered a transient over-temperature condition. However, illumination of the

IN-FLIGHT EMERGENCIES (Cont)

caution light may also indicate an engine or oil system malfunction. Therefore, if the engine oil overheat caution light remains on, proceed as follows:

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 – Adjust.

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, using a precautionary landing pattern.

OIL PRESSURE (BELOW 40 PSI OR ABOVE 55 PSI).

If oil pressure during steady flight drops to below 40 psi range, fluctuates below 40 psi, or rises above 55 psi, proceed as follows:

1. Throttle – Adjust.

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, using a precautionary landing pattern.

NOTE

Oil pressure fluctuations of 2 to 3 psi are permissible provided the readings remain within the allowable oil pressure range of 40 to 55 psi.

- 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.
- Oil pressure will have a tendency to follow the throttle. This condition is normal, provided pressure stabilizes between minimum and maximum limits.
- Refer to Oil Pressure in section VII for information concerning thrust reduction and oil pressure failure.

RAM-AIR TURBINE DOORS OPEN.

If the ram-air turbine (RAT) inlet and exhaust outlet doors open in flight (as indicated by an audible warning in the headset and illumination of the warning light in the landing gear handle if below 10,000 feet), proceed to close the doors to stop the turbine and shut down the emergency hydraulic pump, as follows:

1. Emergency hydraulic pump lever (RAT) – Aft (OFF).
2. If unable to move RAT lever aft:
 - a. Airspeed – Reduce to below 250 knots IAS.
 - b. Ram-air turbine (RAT) circuit breaker – Pull.

IN-FLIGHT EMERGENCIES (Cont)

c. Emergency hydraulic pump lever (RAT) — Aft (OFF).

3. If no other indication of malfunction exists — Leave ram-air turbine (RAT) circuit breaker out and continue mission.

4. If unable to close ram-air turbine doors — Burn fuel and land as soon as practical.

NOTE

Flight control system No. 2 should be monitored during RAT operation because of the possibility of exceeding the maximum allowable pressure.

SMOKE OR FUMES IN COCKPIT.

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 — 100%.
2. Cockpit pressure selector switch — RAM AIR ON.
3. 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.

4. Pitot heat — OFF.

5. Windshield exterior air switch — OFF.

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 O/P¹ and the emergency ram-air lever is at CLOSED, make sure that 100% oxygen is being used. This is a no-ventilation condition.

*Some airplanes

IN-FLIGHT EMERGENCIES (Cont)

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.

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.

SPIN RECOVERY.

If a spin is inadvertently entered, proceed as follows:

1. **THROTTLE – IDLE.** Retard throttle to IDLE to prevent compressor stall.
2. **CONTROLS – RELEASE.** Release all controls and determine spin direction.
3. **EXTERNAL LOAD – JETTISON.**

WARNING

If only pylons are installed, jettison the pylons.

4. **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.

5. **FULL OPPOSITE RUDDER, FULL AILERONS WITH SPIN, AND FULL AFT STICK.**

6. When rotation stops – Initiate stall recovery procedures. When rotation stops, airplane will be in a stall attitude; therefore, use prescribed stall recovery technique.

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 (spin rotation stops) 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. Refer to spins in section VI.

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 opened. With the kit deployed, the rate of descent at touchdown is reduced. In addition to this

IN-FLIGHT EMERGENCIES (Cont)

reduced rate of descent, the crew member 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 preference and boarding technique.) Retrieve survival kit. Do not handle contents carelessly and risk losing equipment that is not properly secured.

If descent is made through a wooded area or tree landing is imminent, immediately prior to tree penetration, jettison the survival kit to preclude possible hang up.

THROTTLE FAILURE.

CAUTION

A fuel control failure can be mistaken for a throttle failure. If throttle response is lost, transfer to the emergency fuel control, in accordance with the instructions under Engine Fuel System Failure in this section, to determine the nature of the failure. If throttle response is not regained, a throttle linkage failure is indicated.

Throttle response has been lost due to the failure of the mechanical linkage and cables between the throttle quadrant and the engine fuel control. The engine is equipped with an automatic advance bungee that will slowly increase the engine RPM to approximately 90% in the event the throttle advance cable fails. If the throttle is in a retarded position and the engine RPM does not increase, this may indicate that the throttle retard cable still has enough tension to counteract the bungee. Moving the throttle forward should relieve the tension on the throttle retard cable and permit the bungee to function.

If throttle linkage failure occurs:

1. With less than 90%, the engine rpm will automatically increase to approximately 90% rpm, with the throttle in the forward position.
2. With more than 90% the engine rpm will NOT automatically reduce.
3. The afterburner is available, if needed, provided the engine rpm has stabilized at or above 89%.

It is also possible that, 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.

WARNING

If the throttle has failed, do not rotate the throttle grip counterclockwise, as this may prevent retarding the throttle below about 85% rpm.

If the throttle linkage has failed, or if attempts to move or retard the throttle fail, set up the recommended precautionary landing pattern, and proceed as follows:

1. Throttle — Do not retard to idle until landing is assured.

WARNING

Moving the throttle to idle could position the fuel control to cut-off and extend the bungee to the point where it could no longer advance the fuel control. There is no restart capability under these conditions.

2. When landing is assured — fuel system shutoff switch OFF.

IN-FLIGHT EMERGENCIES (Cont)

WARNING

When the fuel system shutoff 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 fuel system shutoff switch for shutdown is not comparable with thrust reduction by throttle action.

Should the throttle breakage require an aborted takeoff, immediately move the fuel system shutoff switch to OFF if the throttle cannot be retarded; then deploy the drag chute and apply the brakes as required.

UTILITY HYDRAULIC SYSTEM FAILURE.

There is no emergency utility hydraulic system. If the utility hydraulic system fails, the speed brake, and nose wheel steering 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 may be available for directional control.

- If battle or structural damage is suspected, and arrestment gear permits, an approach end arrestment should be made:

1. Speed brake switch — Check OFF (center).
2. Landing gross weight — Reduce. If conditions permit, remain airborne 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, immediately 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

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.

- No attempt should be made to taxi or park the airplane. Clear runway if possible, install nose gear safety pin and shut down.

YAW AND PITCH DAMPER EMERGENCY OPERATION.

In an emergency, the dampers can be disengaged by pressing the damper emergency disconnect switch lever on the control stick, by moving the yaw-pitch damper switch to OFF, or by pulling the damper circuit breaker. (If the utility hydraulic system fails, the yaw and pitch dampers will be inoperative.)

WARNING

If circuit breaker is to be pulled be prepared to adjust control input as a hard-over yaw could occur. (Perform controllability check at a safe altitude and airspeed. Land as soon as practical.)

LANDING EMERGENCIES

NOTE

After momentary electrical or hydraulic failure, the yaw and pitch dampers may be restored by resetting the yaw-pitch damper switch to ENGAGE 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.

APPROACH END ARRESTMENTS.

Approach end arrestments are recommended for emergency conditions where loss of directional control is anticipated. An early arrestment greatly reduces pilot risk and airplane damage by reducing skid distance. BAK-9, BAK-12, BAK-13 arresting gear are suitable for approach end arrestments with this airplane.

WARNING

MA-1A (net type) barriers are not suitable for approach end (wrong way) arrestments and will cause hook and/or structural failure with little or no change in forward speed. The MA-1A type barrier must be removed from the runway if it is in a position that could interfere with the BAK-9, BAK-12, BAK-13 engagement.

- Do not engage dual BAK-12 barriers unless they are operated in the single mode. Hook loads imposed by a dual BAK-12 operated in the single mode are slightly higher than a conventional BAK-12; therefore, maximum engagement speeds presently shown for BAK-12 barriers must be reduced by 10 percent. Insure that the engagement is made as close as possible to the center of the cable.

NOTE

If battle or structural damage is suspected, an approach end arrestment should be made.

Approach end arrestments are practical only when the arresting cable has at least 400 feet of smooth, load supporting hard surface ahead of the arresting cable. If possible, excess fuel should be burned off and external stores jettisoned prior to the approach. However, retaining the empty drop tanks is recommended regardless of configuration.

With a touchdown speed of 150 knots, the aircraft will cover 400 feet in 1.6 seconds. Therefore, the pilot must plan his approach carefully and be prepared to lower the aircraft nose to the runway immediately after touchdown.

Whenever possible, the pilot should make a "dry run" to check approaches, runway lip, location of approach lights, location of hook cable, determine wind effect and plan a desired touchdown point. If the arresting system is on or near the overrun, the condition of the overrun should be determined as sufficient to withstand the landing.

CAUTION

The aircraft arresting hook hangs below the main gear when in an approach/landing attitude. Sufficient altitude must be maintained to prevent inadvertent engagement of the hook cable or other ground objects.

BAK barrier systems produce a 2.0 to 3.0 G deceleration force. Therefore, the shoulder harness must be locked. Proper alignment with the runway and approach speed and touchdown point will produce a successful landing with minimum possibility of additional airplane damage. (See figure 3-9.)

To accomplish an approach end arrestment, proceed as follows:

1. Load - jettison (retain empty drop tanks),
2. Shoulder harness - Lock.
3. Arresting hook - Release. If time permits, confirm hook extension by other aircraft or tower.
4. Fly final approach at computed approach speed.
5. Touchdown - Plan for touchdown to be on runway or hard surfaced overrun, at least 400 feet short of the arresting gear.

LANDING EMERGENCIES (Cont)

MAXIMUM BARRIER ENGAGEMENT SPEEDS

Design Hook Strength 84,000 pounds

AIRCRAFT WEIGHT lbs	BAK-9		BAK-12		BAK-13	
	MAX ENGAGE SPEED-KTS	ACFT G LOAD	MAX ENGAGE SPEED-KTS	ACFT G LOAD	MAX ENGAGE SPEED-KTS	ACFT G LOAD
24,000	190	2.92	190	3.00	170	3.00
28,000	189	2.68	190	2.75	170	2.68
32,000	185	2.35	190	2.56	170	2.44
36,000	181	2.14	185	2.34	170	2.28
40,000	177	2.00	180	2.20	170	2.10

NOTE

If the speed limits shown above are exceeded, a write-up in the Form 781 is required, and the incident must be reported to the system manager, Sacramento ALC (MMBT), for engineering evaluation.

Figure 3-9

Immediately after touchdown:

6. Throttle – Idle.

NOTE

The throttle may be inadvertently advanced should deceleration forces cause the pilot's hand to be thrown forward on the throttle.

7. Lower nose wheel to runway.

WARNING

The nose wheel must be on the runway prior to barrier engagement, otherwise the nose gear may fail as it contacts the runway.

- Avoid nose high engagement attitude and engagement while the airplane is still above the ground. Any go around with the arresting hook extended must be initiated well out on final to preclude the possibility of an airborne engagement.

8. Nose wheel steering – Engage. Steer for center of hook cable and make contact perpendicular. Attempt to maintain directional control for centerline engagement. Be prepared to correct for yaw after engagement.

9. Drag Chute – Deploy. Crosswind permitting.

CAUTION

Do not use the brakes. A locked wheel may snag or cut the cable. The wheels should be rolling when passing over the cable.

LANDING EMERGENCIES (Cont)

LANDING GEAR MALFUNCTIONS – EMERGENCY LANDINGS

DESCRIPTION OF MALFUNCTIONS	RECOMMENDED ACTION
All Gear Up	Normal Landing or Controlled Ejection. (1) (2)
Nose Gear Up Main Gear Down	Normal Landing. No Approach End Engagement. Fly nose onto Runway Before Losing Pitch Control. (1) (2)
One Main Gear Up Nose Gear Down	Approach End Engagement (1) If possible retract main gear
Both Main Gear Up Nose Gear Down	Approach End Engagement (1) (3) Refer to Main Gear or Belly Landing.
One Main Gear Up Nose Gear Up	If landing gear can be actuated, retract all gear and refer to All Gear Up. If unable, recommend ejection. Approach End Engagement Not Recommended.
Nose Gear Canted	Normal Landing
Gear Down Indicator Lights Off	Treat as Corresponding Gear Up Unless Determined to be Down.
Blown Tires	Approach End Engagement (if necessary)

High sink rates on landing must be avoided.

- NOTES:**
1. Runway should be framed if time permits.
 2. Remove runway arresting cable in landing roll-out area to prevent engagement of aircraft by cable.
 3. If the emergency gear lowering procedure has been followed, the gear doors will be open and they could cut or snag the cable; however, an approach end arrestment attempt is still considered the best course of action.

WARNING

An arrested landing should not be attempted with nose gear up and main gear extended as severe aircraft damage and possible crew injury may result.

Before attempting a landing utilizing a listed procedure, consider:

- a. The location and type of arresting gear to be used.
- b. Crosswind conditions.
- c. Runway and/or overrun conditions.

Figure 3-10

LANDING EMERGENCIES (Cont)

NOTE

The canopy provides protection from flash fires; therefore, do not jettison the canopy.

10. Throttle – Off. If required, after fire crew confirms that no fire hazard exists from discharged fuel.

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 ditching is unavoidable, proceed as follows:

1. Radio – Distress procedure.
2. Oxygen – 100%.
3. Load – Jettison.
4. Personal equipment leads – Disconnect all except oxygen hose.
5. Shoulder harness – Lock.
6. Speed brake – DOWN.
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 mask – 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.

PRECAUTIONARY LANDING PATTERN.

The prime objective of the precautionary landing pattern (PLP) is to get the aircraft on the runway on the first attempt. Basic considerations when executing a PLP are: Do not descend below minimum safe ejection altitude until required for approach and landing; fly as near the normal 2-3 degree approach to landing as possible; eject whenever the situation begins to deteriorate to a point where the desired safe approach cannot be made. The PLP will be slightly larger than the normal landing pattern and can be entered on downwind, base or final approach. Because of the many variables, pilot evaluation of the factors and judgement will determine pattern and entry point requirements. However, there are some general procedures which are applicable:

When on the final approach glide path:

1. The landing gear should be down, the flaps down, and the RAT extended (if applicable).
2. A normal glide path should be flown, maintaining recommended computed final approach speed and avoiding excessive rate of descent.
3. Power should be used as necessary to transition to a normal flared landing.

FORCED LANDING (TYPICAL)



WARNING

THIS PATTERN WILL NOT BE ATTEMPTED UNLESS ESCAPE FROM THE AIRPLANE IS IMPOSSIBLE

Air start attempts should not be continued after low-key point is reached; however, this does not prohibit air start attempts when flame-out occurs below low key altitude.

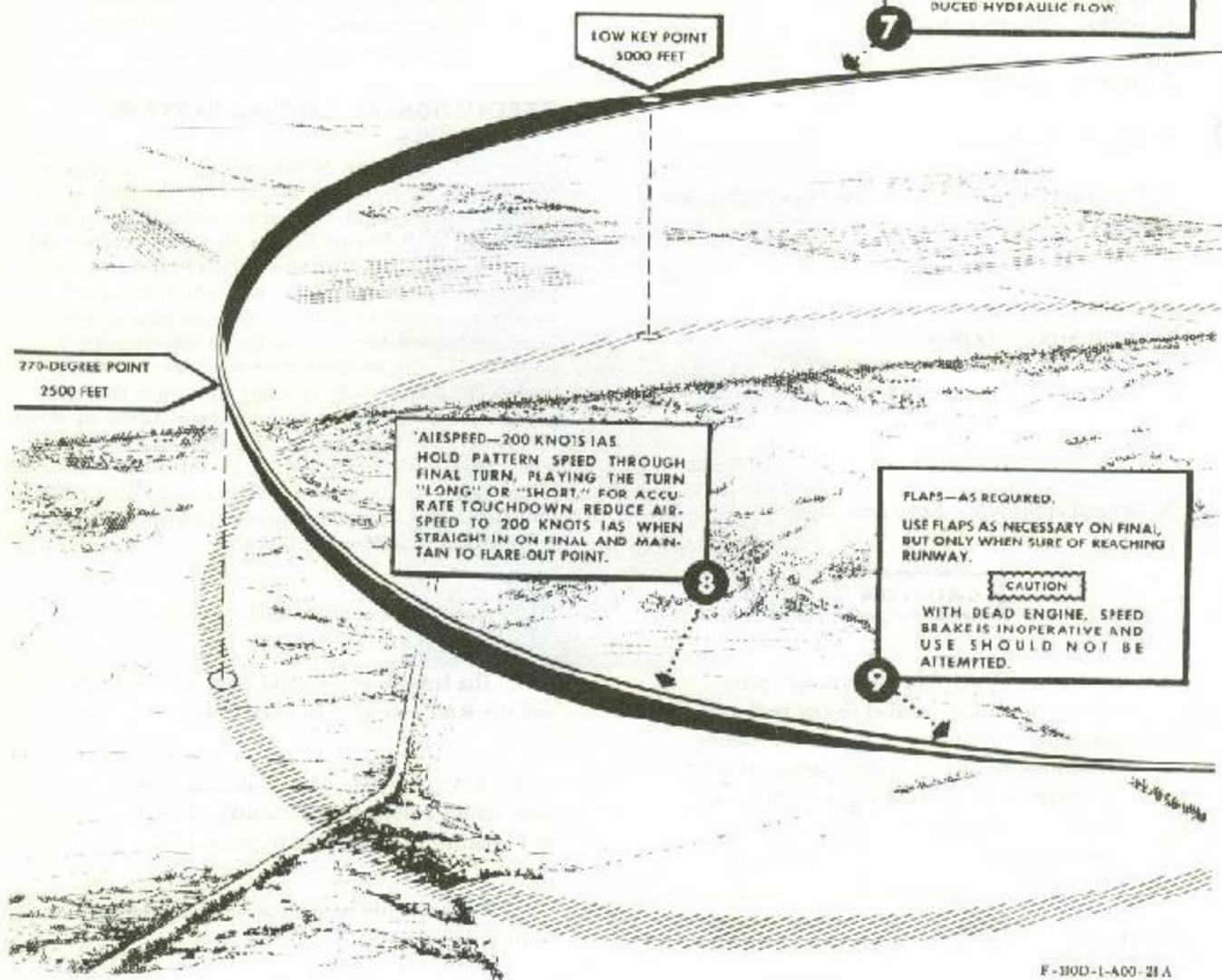
(WINDMILLING OR "FROZEN" ENGINE)

Speeds given are for any clean airplane weight condition.

AIR SPEED—220 KNOTS IAS.
HOLD A CONSTANT SPEED OF 220 KNOTS IAS IN PATTERN UNTIL ON FINAL. FLY A PATTERN, VARYING FLIGHT PATH TO MAKE KEY POINTS AIM FOR ONE-THIRD POINT OF RUNWAY.

WARNING

AVOID EXCESSIVE USE OF CONTROLS, ESPECIALLY AILERONS, AS AIRPLANE CONTROL IS MARGINAL BECAUSE OF REDUCED HYDRAULIC FLOW.



270-DEGREE POINT
2500 FEET

LOW KEY POINT
5000 FEET

AIR SPEED—200 KNOTS IAS
HOLD PATTERN SPEED THROUGH FINAL TURN, PLAYING THE TURN "LONG" OR "SHORT," FOR ACCURATE TOUCHDOWN. REDUCE AIRSPEED TO 200 KNOTS IAS WHEN STRAIGHT IN ON FINAL AND MAINTAIN TO FLARE-OUT POINT.

FLAPS—AS REQUIRED.
USE FLAPS AS NECESSARY ON FINAL, BUT ONLY WHEN SURE OF REACHING RUNWAY.

CAUTION

WITH DEAD ENGINE, SPEED BRAKE IS INOPERATIVE AND USE SHOULD NOT BE ATTEMPTED.

F-100D-1-A00-21A

Figure 3-11 (Sheet 1 of 2)

LANDING EMERGENCIES (Cont)

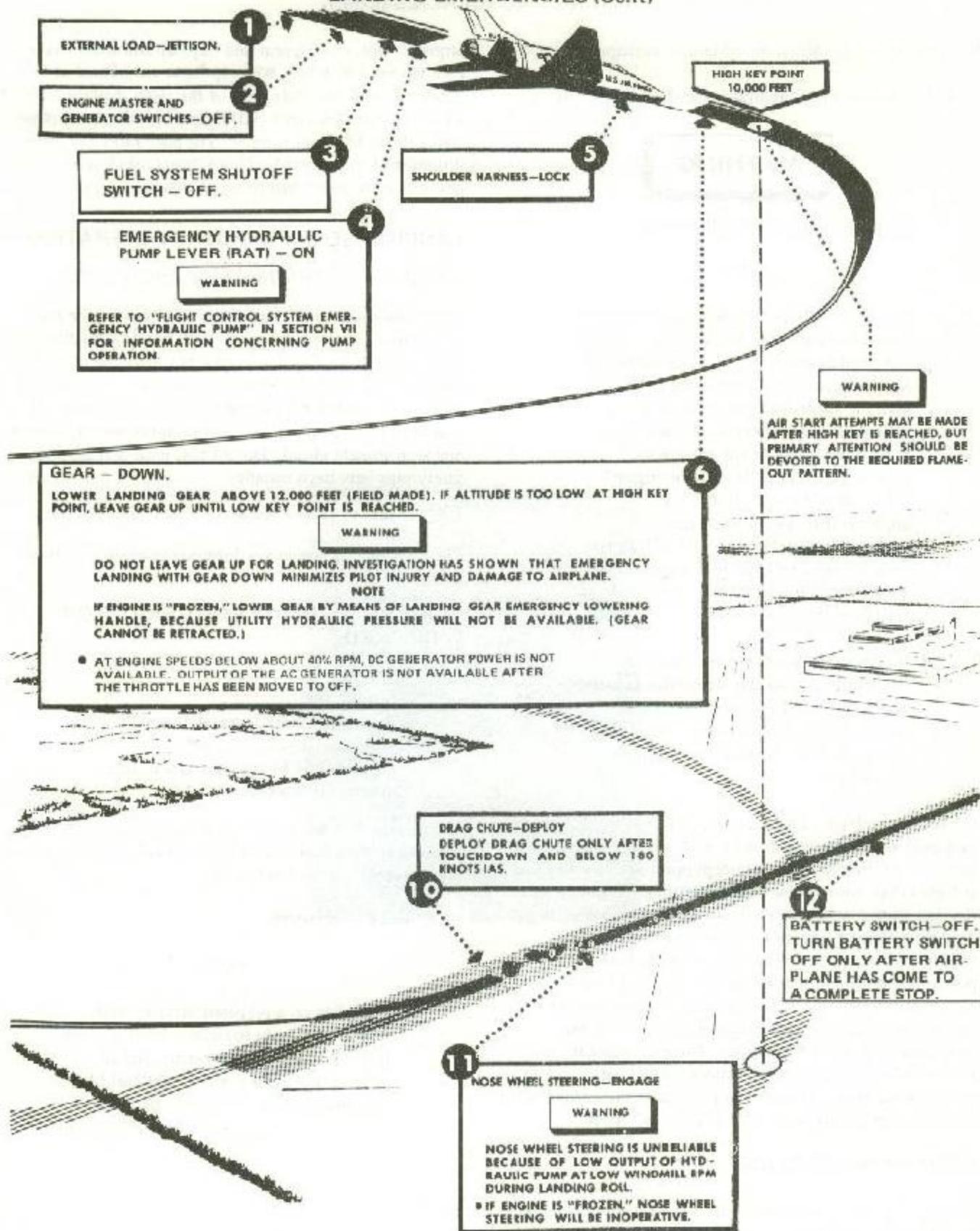


Figure 3-11 (Sheet 2 of 2)

LANDING EMERGENCIES (Cont)

If engine related problems are evident or anticipated:

4. Fly the computed approach speed plus 20 knots.

WARNING

If unable to maintain PLP airspeed - Eject.

NOTE

The larger PLP pattern will aid in avoiding unnecessary G-loads which could accelerate potential bearing failure. If the nature of the emergency restricts the use of throttle, plan the approach for a constant power setting using speed brake, gear and flaps as required to adjust the pattern to desired parameters. If a fire or engine failure should occur, or it becomes apparent that the runway cannot be made with available power, the 20 knots extra airspeed will permit a smooth, wings level zoom maneuver and an ejection in at least level flight.

- If control problems are encountered, controllability checks may determine higher approach and touchdown speeds and power and flare requirements may have to be altered to ensure aircraft control to touchdown.

In executing a PLP, a basic approach which should encompass most situations would find a pilot arriving at a point just short of the glide path intercept point at 230 KIAS and at higher than normal base or final altitude (minimum safe ejection altitude or higher) with a stabilized power setting. At glide path intercept, or just prior to if the situation requires, select gear and flaps and use speed brake and power as appropriate to establish the required final approach airspeed. As near as possible, fly the familiar, normal final approach, avoiding high rates of descent and excessive control movements. Once a landing is assured, adjust for any extra airspeed carried with throttle and/or speed brake, to as near as possible at the normal touchdown point and computed touchdown speed.

RECOMMENDED GLIDE.

For glide distances with a windmilling or frozen engine, the recommended gliding speed is 220 knots IAS for a clean

airplane, with landing gear and flaps up and speed brake in. (See figures 3-4, 3-12.) 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.

LANDING GEAR EMERGENCY OPERATION.**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 3-13). Attempt to obtain a positive confirmation of the gear condition from the tower or chase plane. 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 GEAR EMERGENCY LOWERING.

The landing gear emergency lowering procedure is shown in figure 3-13.

LANDING WITH ANY ONE GEAR UP OR UNLOCKED.**NOTE**

If either or both main landing gear cannot be locked down, an approach and arrestment should be considered if suitable barrier facilities are available.

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. **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.

LANDING EMERGENCIES (Cont)

GLIDE DISTANCES

NO WIND

APPLICABLE FOR ANY CLEAN AIRPLANE WEIGHT CONDITION.

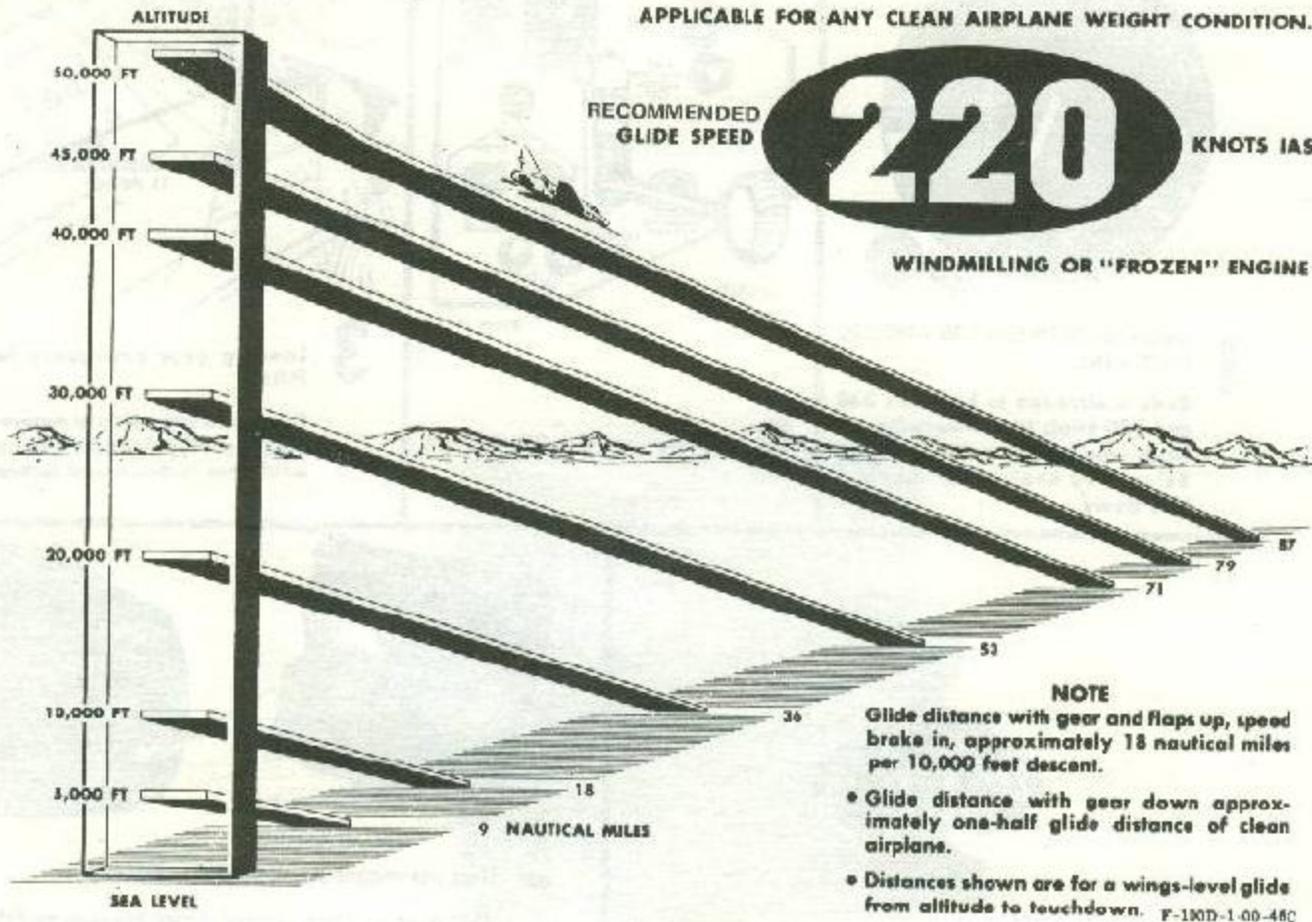


Figure 3-12

2. Gear – DOWN.
3. Shoulder harness – Lock.
4. Speed brake – UP.
5. Flaps – DOWN.
6. Throttle – OFF when landing is ensured.
7. Engine master switch – OFF.
8. Fuel system shutoff switch – OFF.
9. Touch down on extended gear. Hold opposite wing, or nose, off ground as long as possible, but lower while control is available.
10. Drag chute – Deploy.

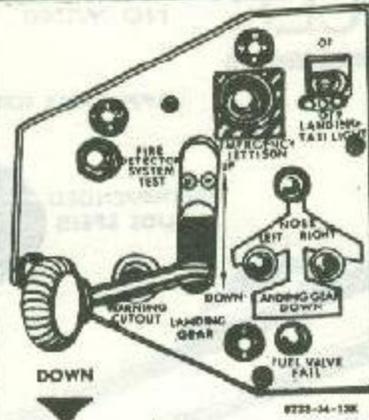
LANDING EMERGENCIES (Cont)

LANDING GEAR EMERGENCY LOWERING

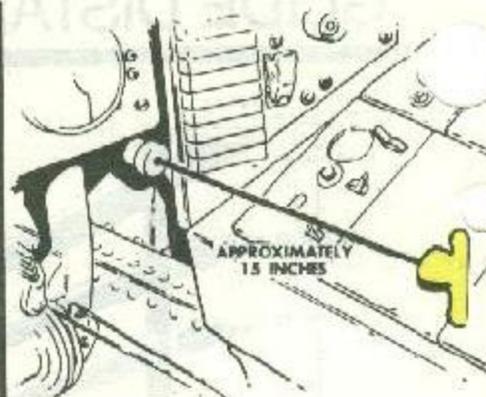


1 Airspeed—BETWEEN 230 AND 180 KNOTS IAS.

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.

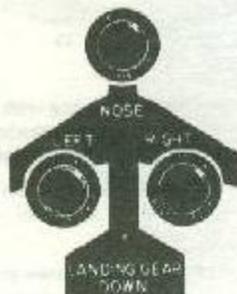


2 Landing gear handle—DOWN.



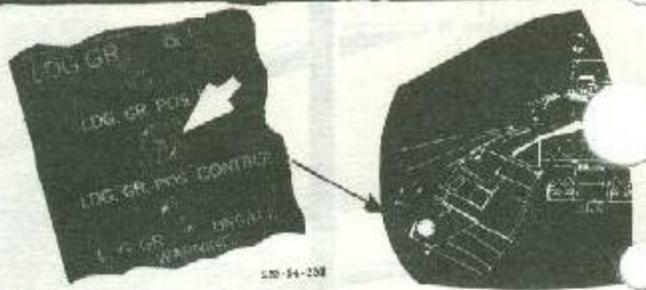
3 Landing gear emergency handle—PULL.

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 Gear pos control 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.

Figure 3-13

LANDING EMERGENCIES (Cont)

11. Battery switch – OFF.

CAUTION

Turn fuel system shutoff switch OFF before battery switch is turned OFF, so that battery power is available to close the fuel shutoff valve.

- Battery switch must be ON, if nose wheel steering or antiskid is required.

MAIN GEAR UP OR BELLY LANDING (PREPARED SURFACE ONLY).

NOTE

If either or both main landing gear cannot be locked down, an approach end arrestment should be considered if suitable barrier facilities are available.

- When the gear cannot be lowered by the normal system, the emergency procedure will be used. (See figure 3-13.) 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 position control circuit breaker – Check in.
2. Gear – UP. Retract main gear so that landing can be made on nose gear and aft fuselage (or empty drop tanks).
3. 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. Deploy drag chute while airborne, just before touchdown.

6. Normal touchdown.

7. Throttle – OFF. When landing is assured, move throttle to OFF.

8. Nose wheel steering – Engage. Engage nose wheel steering if nose gear is extended.

9. Engine master switch – OFF.

10. Fuel system shutoff switch – OFF.

11. Battery switch – OFF.

CAUTION

Turn fuel system shutoff switch OFF before battery switch is turned OFF, so that battery power is available to close the fuel system shutoff valve.

- Battery switch must be ON, if nose wheel steering or antiskid is required.

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.

LANDINGS ON UNPREPARED SURFACES.

Landings on unprepared surfaces are not recommended. However, if an emergency landing on an unprepared

LANDING EMERGENCIES (Cont)

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 than those made with gear up. Empty drop tanks should be retained to cushion impact loads and minimize airplane damage as much as possible.

LANDING WITH ARRESTING HOOK EXTENDED.

If the arresting hook is inadvertently released in flight, it will not introduce any problem while airborne, and a safe landing can be made with the hook extended. However, the following conditions must be considered:

1. With a normal 2-3 degree final approach in normal landing attitude, the tail hook extends approximately 4 to 5 feet below the main gear and will contact the runway approximately 76 feet before the main gear touchdown.
2. Location and type of barriers on the approach end of the runway.
3. Condition of the approach end overrun and the lip of the prepared runway.

If a landing must be made with an extended tail hook, and time is available, the barriers on the approach end should be removed to eliminate any possibility of an approach end engagement.

WARNING

If time is not available to remove both barriers, at least the MA-1 barrier should be removed, if possible, as engagement of the MA-1 barrier on the approach end will result in serious airplane damage and control problems.

During final approach, fly a normal approach, maintaining a minimum height of 25 feet above any obstructions (runway barrier or runway lip) that could engage the tail hook.

NOSEWHEEL STEERING SYSTEM MALFUNCTION.

During landing roll, malfunctions of the nosewheel steering have occurred which have caused the aircraft to swerve immediately upon depressing the nosewheel steering button. Other malfunctions have occurred in which the aircraft turned sharply on the first movement of the rudder pedals. The onset of the hard turn is extremely rapid, and the swerve may not be controllable with full opposite rudder and brake. In the event of such a malfunction, immediately disengage the nosewheel steering. In most cases, the nose wheels will caster to a neutral position. This will eliminate the unwanted turning motion and directional control can be maintained by rudder and differential braking. Even if rudder and brakes are not sufficient to keep the aircraft on the runway, do not attempt to re-engage the nosewheel steering because full nose wheel deflection is likely to recur. If nosewheel steering malfunction occurs:

1. Nosewheel steering – Disengage.
2. Directional control – maintain with rudder and differential braking. Do not attempt to re-engage nosewheel steering.

TIRE FAILURE.

CAUTION

Avoid extreme rudder pedal deflections when nosewheel steering is engaged, since this may cause nose wheels to skid or skip sideways, and steering effectiveness will be lost.

LANDING WITH MAIN GEAR TIRE FAILURE, OR FAILURE DURING LANDING.

When landing with a flat main gear tire, lower gear in the normal manner and proceed as follows:

1. ANTISKID SWITCH – OFF.

LANDING EMERGENCIES (Cont)

2. Normal approach. (If airborne.) 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. (If airborne.)

4. Nose wheel steering — Engage.

5. Drag chute — Deploy.

6. Wheel brakes — Maintain directional 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.

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.

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, fly a straight in final approach adding 10 knots to the recommended final approach and touchdown speeds.

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.

LANDING EMERGENCIES (Cont)

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 retained, 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.

WHEEL BRAKES OVERHEATED.

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.

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.

ABBREVIATED CHECKLIST.

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



Section IV

AUXILIARY
EQUIPMENT

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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 Air-flow Circuits in section VII.) Both the primary heat

COCKPIT AIR CONDITIONING AND PRESSURIZATION

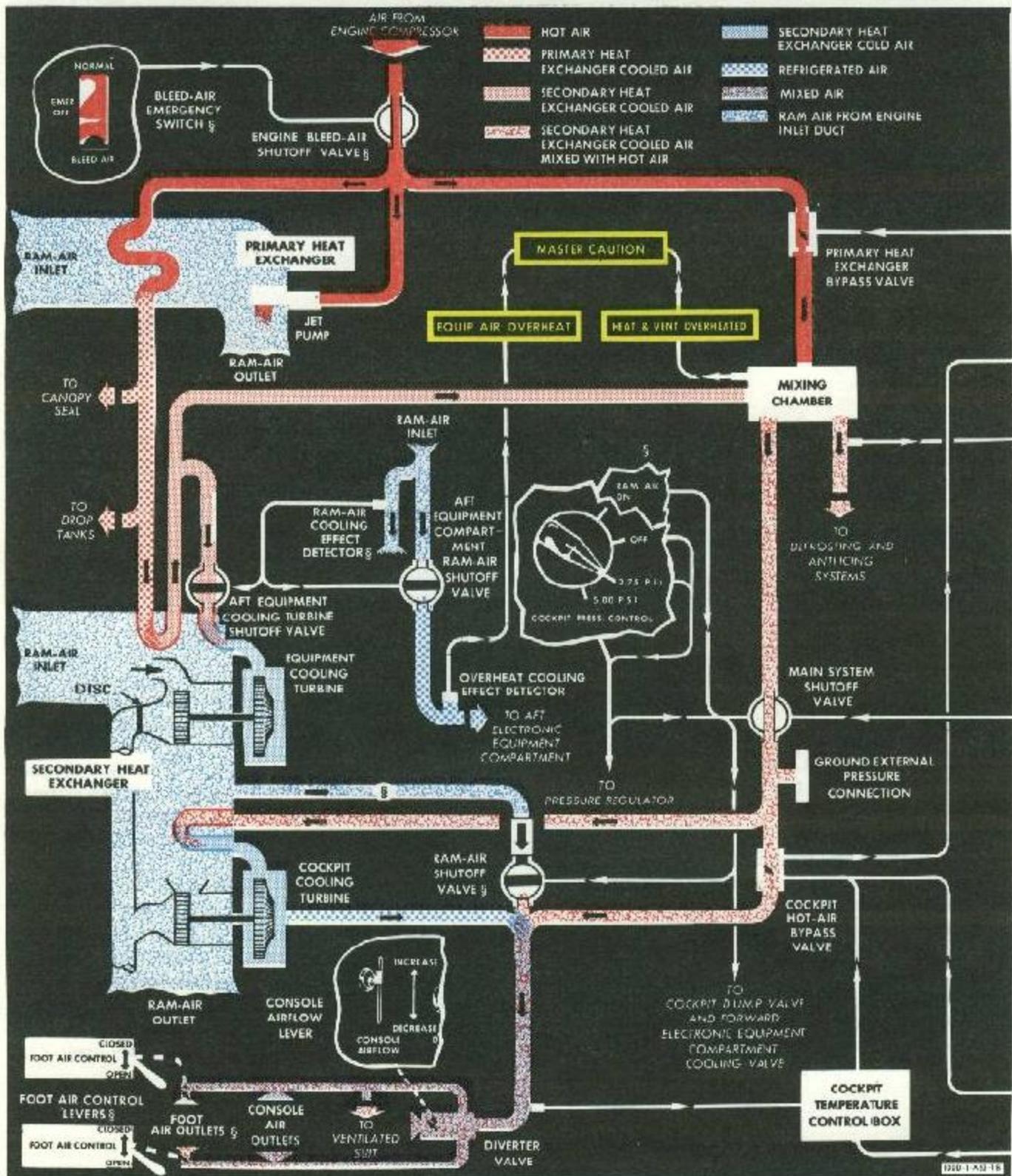


Figure 4-1 (Sheet 1 of 4)

SYSTEM

F-100D AIRPLANES

NOTE

Lights shown on for information only.

- ELECTRICAL CONNECTION
 - - - MECHANICAL LINKAGE
 AIR CHECK VALVE

§ Some airplanes (refer to applicable text).
 Deactivated on airplanes changed by
 T.O. 1F-100D-638

*Some airplanes.

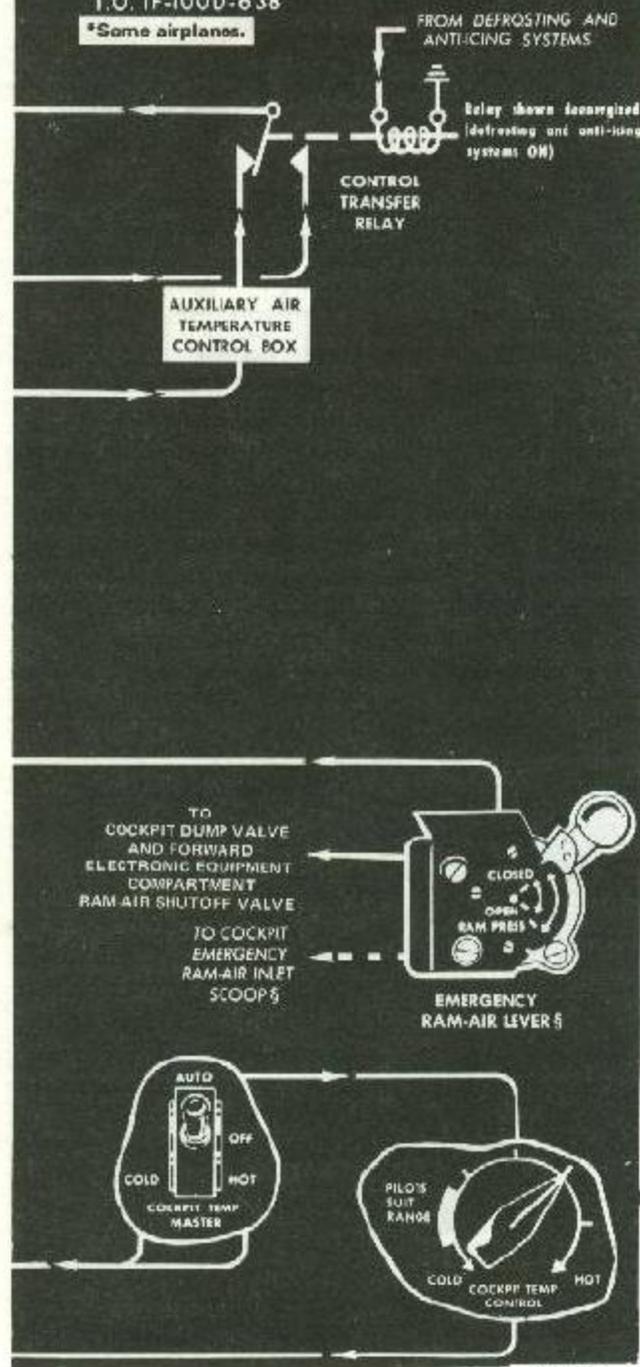


Figure 4-1 (Sheet 2 of 4)

exchanger bypass valve and the cockpit hot-air bypass valve are positioned by the cockpit temperature control box (defrosting and anti-icing systems OFF) to provide the selected temperature. Both valves are positioned by the cockpit temperature control box through the auxiliary temperature control box when the defrosting and anti-icing systems (pitot boom heat, windshield exterior air, or canopy and windshield defrost) are ON. Emergency cockpit ventilation is obtained from the manually operated ram-air scoop on F-100F Airplanes and F-100D-91 Airplanes, and by the RAM AIR ON position of the cockpit pressure selector switch on other F-100D Airplanes.*

COCKPIT PRESSURIZATION.

Cockpit pressure is maintained above 12,000 feet at a pilot-selected schedule of 2.75 psi or 5 psi (5 psi only on F-100F-20 Airplanes) by a pressure regulator that controls the discharge of the air conditioning air from the cockpit. When the 2.75 psi schedule is used, a cockpit pressure equal to that of 12,500 feet is maintained to a flight altitude of 21,200 feet, and a constant 2.75 psi differential between cockpit and atmospheric is maintained above 21,200 feet. When the 5 psi schedule is used, a cockpit pressure equal to that of 12,500 feet is maintained up to 31,000 feet and a 5 psi differential between cockpit and atmospheric is maintained 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.

NOTE

The minimum engine rpm needed to maintain cockpit pressurization is about 85%, depending on altitude and selected cockpit pressure schedule.

DEFROSTING, ANTI-ICING, AND RAIN REMOVAL SYSTEM.

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), and on

*F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes

COCKPIT AIR CONDITIONING AND PRESSURIZATION SYSTEM

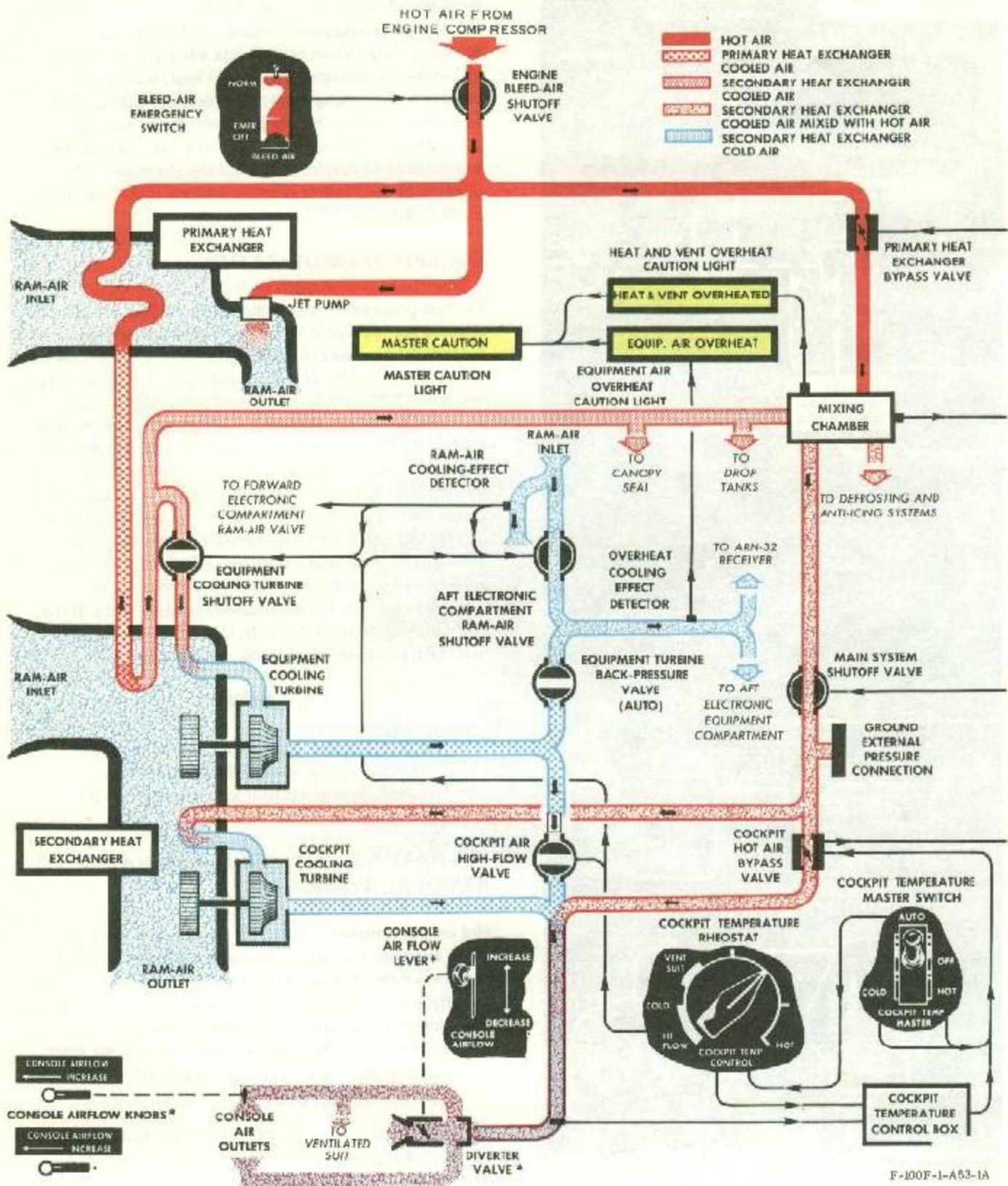
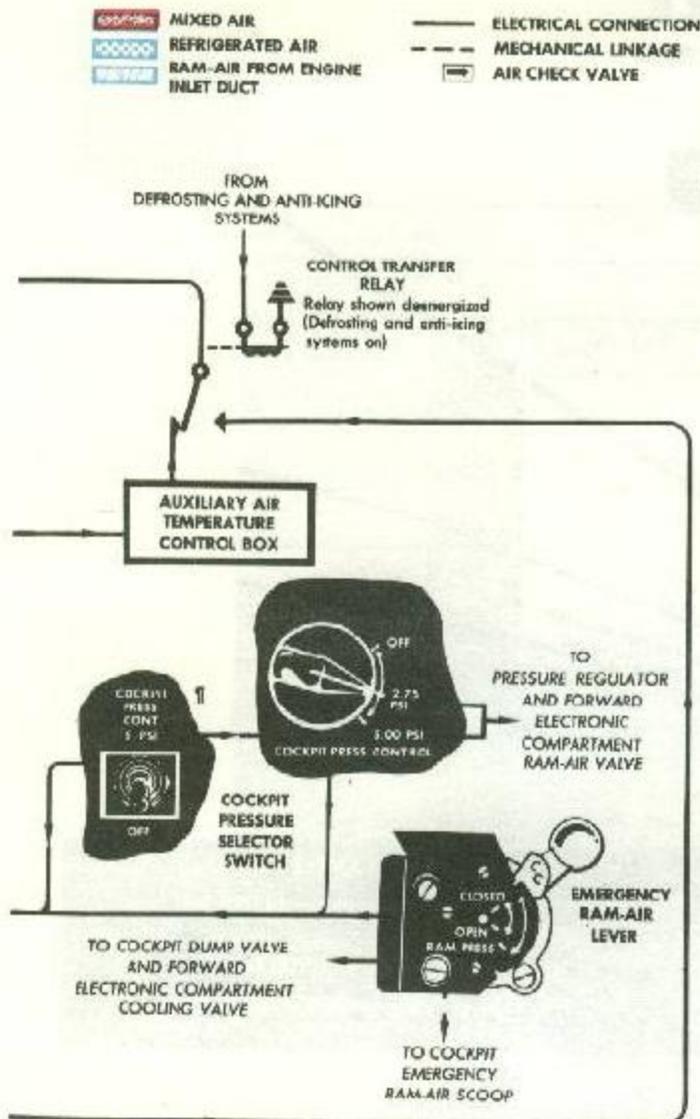


Figure 4-1 (Sheet 3 of 4)

F-100F-1-A53-1A

F-100F AIRPLANES



* Some airplanes (refer to applicable text).

† F-100F-20 Airplanes

NOTE

Lights shown on for information only.

100P-1-153-08

some airplanes, pitot boom anti-icing and foot warmers. On F-100F-20 Airplanes, pitot boom anti-icing is provided by an electrical heating system. 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 switch (not in the rear cockpit). (See figure 4-1.) When the switch is at 2.75 psi or 5 psi, the main system shutoff valve is open to direct air to some cockpit air outlets, the emergency ram-air valve* is closed, the forward electronic equipment compartment ram-air shutoff valve is automatically controlled by a cooling-effect detector, and the pressure regulator maintains the selected pressure differential in the cockpit. (F-100F-20 Airplanes have only the 5 psi pressure schedule.) When the selector is at RAM AIR ON, the main system shutoff valve closes, the emergency ram-air valve* opens to admit ram air to the cockpit, the dump valve opens to depressurize the cockpit, and the forward electronic equipment compartment ram-air shutoff 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 main system shutoff valve, the emergency ram-air valve, and the cockpit dump valve, and the cockpit pressure regulator is set to 2.75 psi position. The OFF position is used in emergencies if the cockpit becomes too cold with the cockpit pressure selector at RAM AIR ON.* The OFF position is also used to prevent rapid decompression of the cockpit

*F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes

Figure 4-1 (Sheet 4 of 4)

COCKPIT PRESSURE SCHEDULE

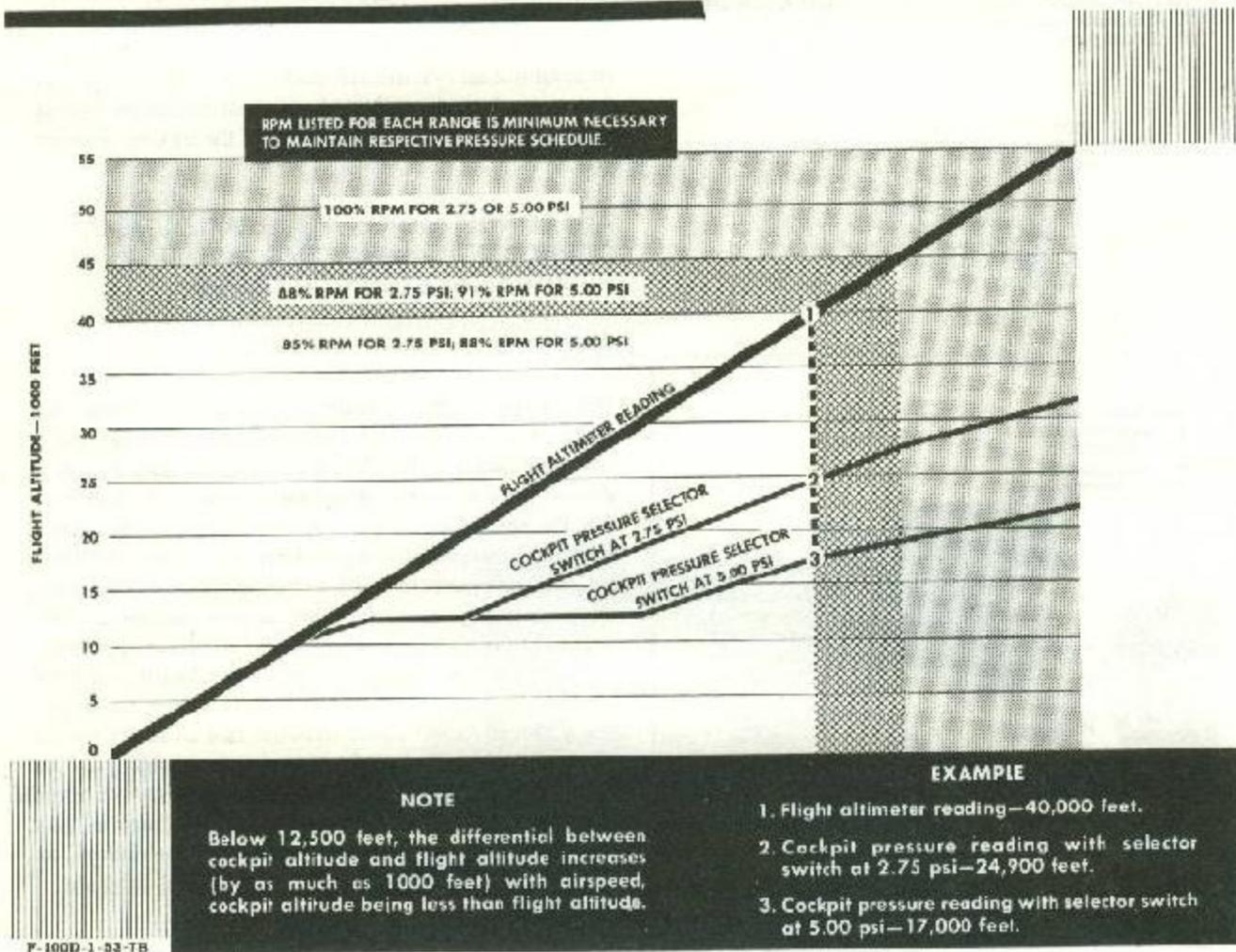


Figure 4-2

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 resulting from sudden decompression, the cockpit pressure selector switch should be set at 2.75 psi during combat above 21,200 feet.

WARNING

When the cockpit pressure selector switch is at OFF, 100% oxygen should be used to

offset the effect 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 psi or 5 psi 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

*F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes

DEFROSTING AND ANTI-ICING SYSTEMS

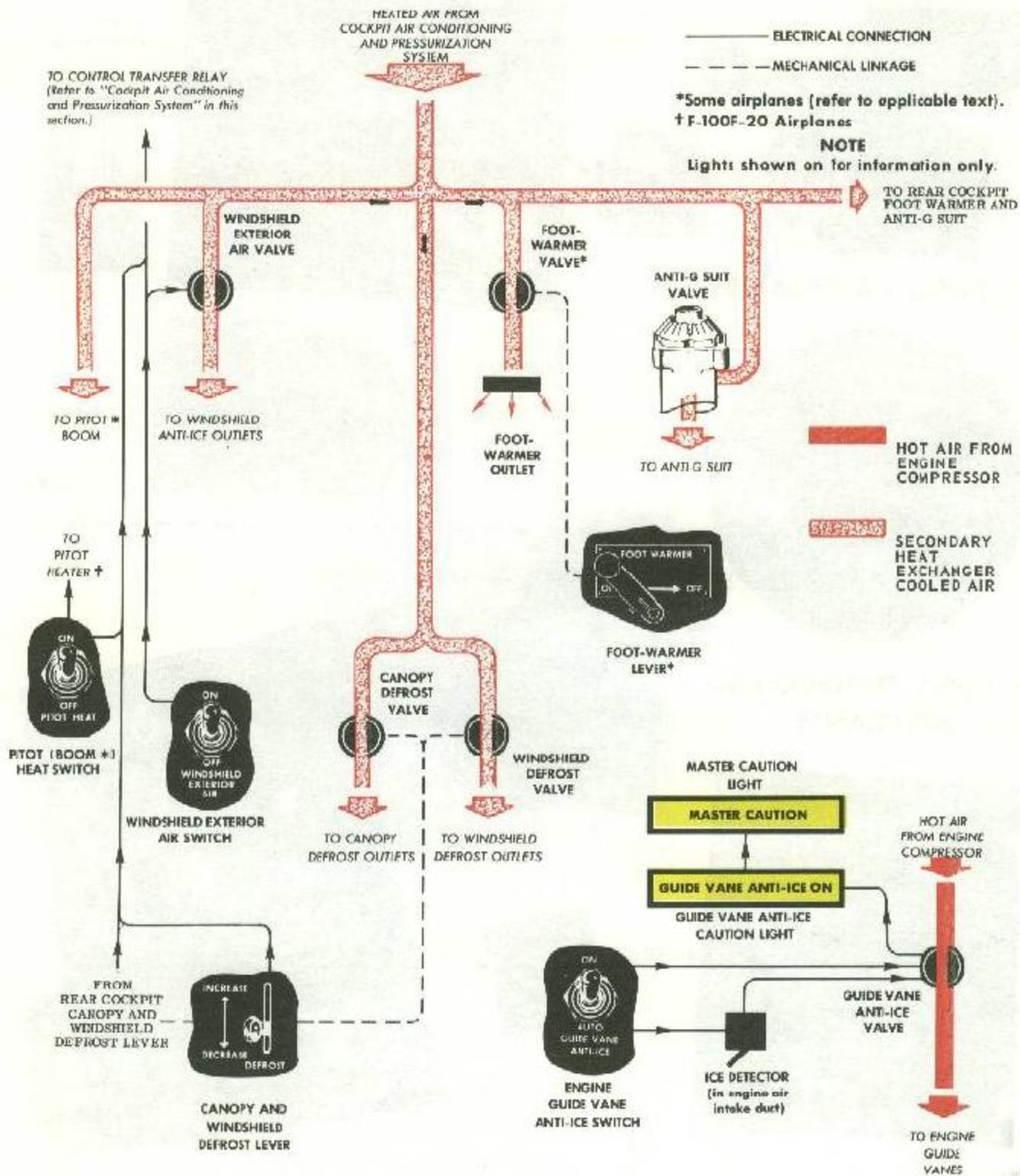
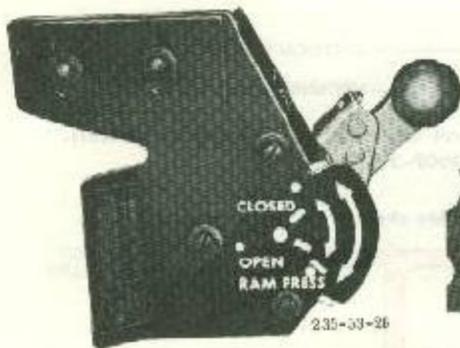


Figure 4-3

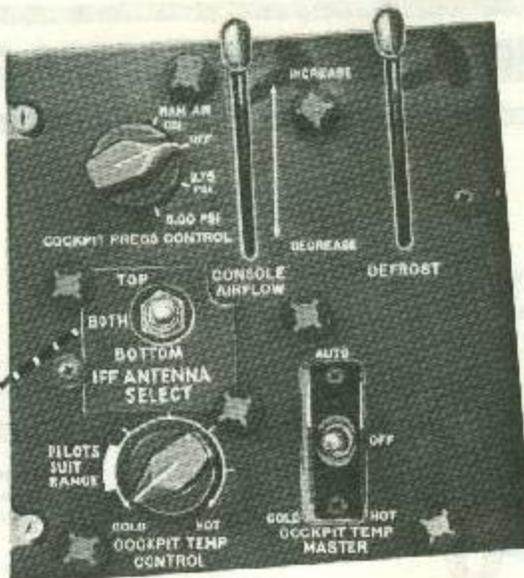
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AIR-CONDITIONING CONTROLS



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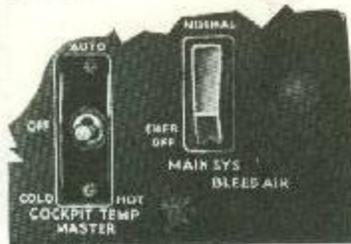
F-100D AIRPLANES



203-51-20

SOME AIRPLANES

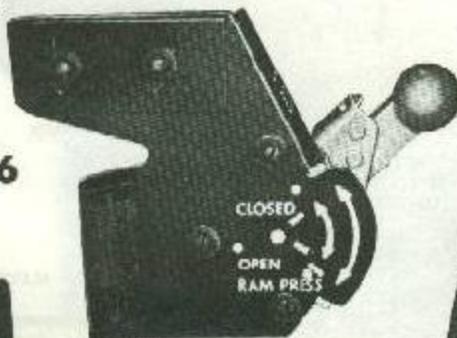
SOME AIRPLANES



SOME AIRPLANES



F-100F-2 THROUGH-16 AIRPLANES



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FRONT

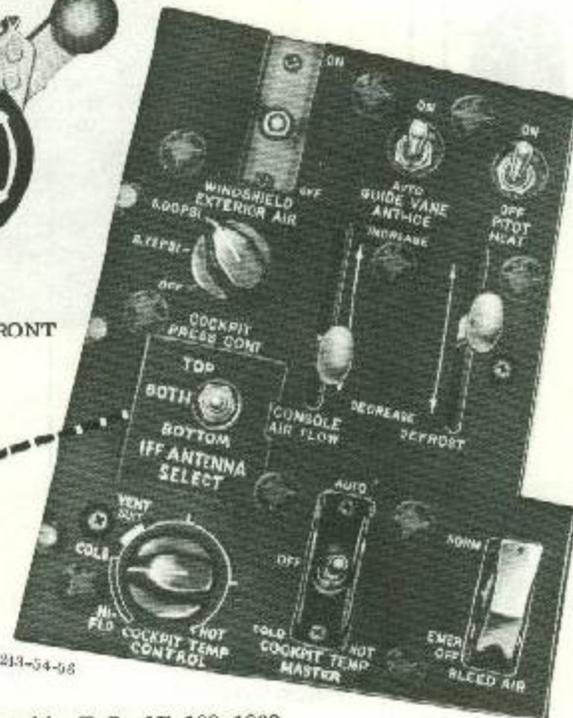


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REAR



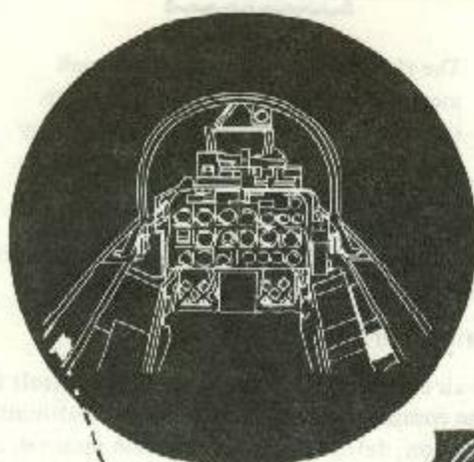
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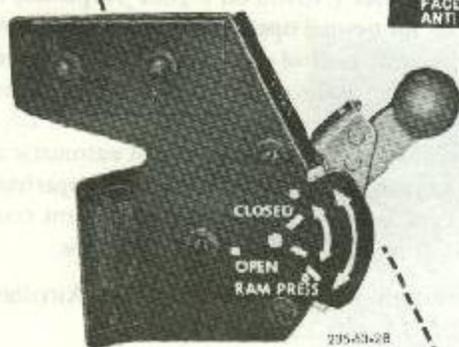
* Not on airplanes changed by T.O. 1F-100-1062

Figure 4-4 (Sheet 1 of 2)

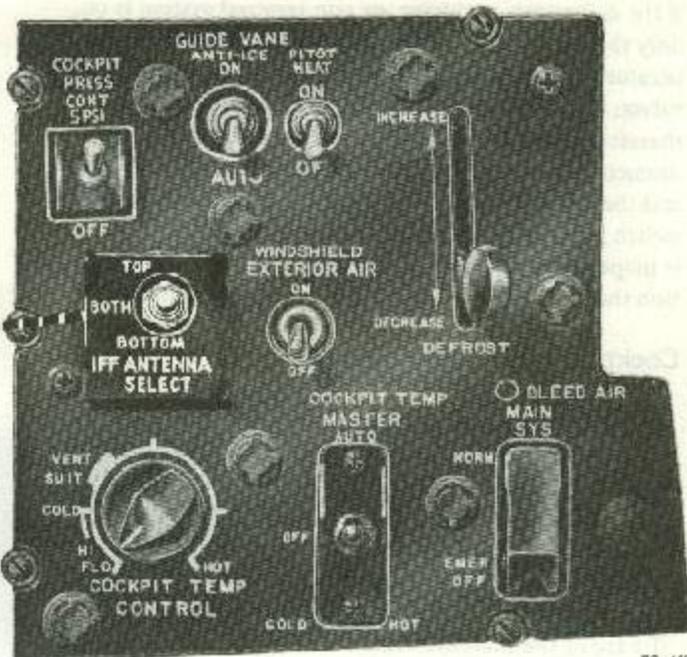
F-100F-20 AIRPLANES



FRONT COCKPIT

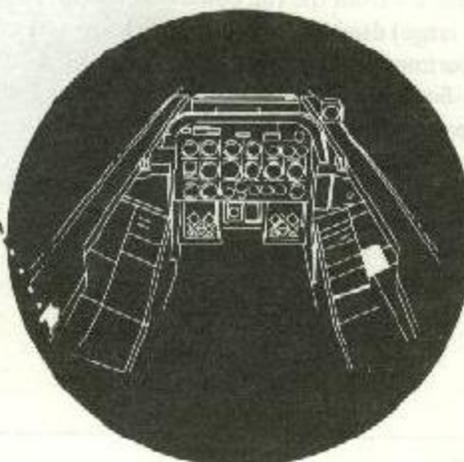


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FS-403



REAR COCKPIT

*Not on Airplanes Changed by T.O. 1F-100-1062.

Figure 4-4 (Sheet 2 of 2)

100F-1-59-15A

temperature rheostat must be adjusted to the desired temperature. For selective temperature control, the 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-FLOW 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 within a 55-degree arc from the full counterclockwise position (HI-FLOW range) disengages the automatic control of electronic compartment cooling airflow, and opens the cockpit air high-flow valve. Ram air to the forward and aft electronic equipment compartments is shut off when the automatic control is disengaged and the aft electronic 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 compartments is turned on, and the aft electronic equipment cooling turbine is shut down on F-100F Airplanes.

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 35, figure 1-6; 36, figure 1-7; 27, figure 1-12; 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 (24, figures 1-8 and 1-9) on the forward

*Some airplanes

†F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes

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, figures 1-14 and 1-15; 27, figure 1-16; 18, figure 1-17; 19, figure 1-18), 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.

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. With the lever at CLOSED, the forward electronic equipment compartment ram-air shutoff valve is automatically controlled by a cooling-effect detector. The lever must be at CLOSED

to permit normal pressurization of the cockpit. On F-100F Airplanes, the front and rear cockpit levers are not interconnected, and each lever must be at CLOSED to permit normal pressurization. Moving the lever (either lever on F-100F Airplanes) from CLOSED to OPEN manually opens the ram-air scoop (respective cockpit scoop on F-100F Airplanes) into the air stream, allowing ram air to enter 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) 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) 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.

CAUTION

On F-100F-20 Airplanes, during certain conditions when ram air is used to cool the cockpit, the equipment air overheat caution light may come on. If this light is on for a prolonged period, the electronic equipment may be damaged. The light can be put out by either increasing airspeed or changing to normal cockpit air conditioning.

Canopy and Windshield Defrost Lever.

Defrosting of canopy and windshield is selected by a defroster 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.

‡F-100D Airplanes, F-100F-2 through F-100F-11 Airplanes, and F-100F-16 Airplanes AF56-3920 through -3984

†F-100D-21 through F-100D-31 and F-100D-46 through F-100D-86 Airplanes

§F-100F-16 Airplane AF56-3985 and all later airplanes

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 4-17.) Moving the switch to ON de-energizes the control transfer relay. This opens the primary heat exchanger bypass valve, allowing hot air (about 275°F) to flow from the mixing chamber to the windshield exterior air shutoff valve. When the windshield exterior air switch is at ON, the windshield exterior air shutoff valve is open, allowing the air from the mixing chamber to flow into the discharge nozzle at the base of the windshield. With the switch at OFF, the exterior air shutoff valve is closed, the control transfer relay is energized, and the primary heat exchanger bypass valve is closed. (Operation of the motor-driven exterior air 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 aft electronic 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 4-17.) When the switch is at AUTO, primary bus power arms the ice detector unit, which automatically controls the engine guide vane anti-icing valves. When 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 de-ice the guide vanes and accessory nose strut. The valves remain open as long as impulses are received from the ice detector unit, but close automatically one minute after the last impulse is 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.) Moving the switch to ON de-energizes the control transfer relay. This opens the primary heat exchanger bypass valve, allowing hot air (about 275°F) to flow from the mixing chamber to the pitot boom. With the switch at OFF, the control transfer relay is energized, the bypass valve closes, and air of slightly lower temperature is supplied from the mixing chamber to the boom. The switch should be at ON during all takeoffs to ensure accurate instrument indications. The pitot boom heat switch is powered by the primary bus.

NOTE

Continuous operation of pitot heat at ON over an extended period can cause illumination of the heat and vent system over-heat caution light.

Pitot Heat Switch – F-100F-20 Airplanes.

The electrical heating unit in the pitot boom is controlled by the pitot heat switch (figure 4-4) in the front cockpit only. When this switch is moved from OFF to ON, secondary bus power is supplied to the pitot heat unit. The switch should be ON for all takeoffs to ensure accurate instrument indications. After takeoff, the switch should be used as required.

CAUTION

The electrical pitot heat system should not be used on ground (except for test purposes and just before takeoff), because lack of cooling airflow may cause the heating element to burn out.

*F-100D Airplanes and F-100F-2 through F-100F-16 Airplanes

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 (20, figure 1-10; 22, figure 1-11; 28, figure 1-12; 26, figure 1-13; 19, figure 1-15; 19, figure 1-16) vented only to pressure within the cockpit.

Heat and Vent System Overheat Caution Light.

A placard-type caution light (figure 1-19) comes on when the temperature of the air in the mixing chamber exceeds 345°F (400°F on F-100F Airplanes). The overheat caution light is powered by the primary bus, and bulbs in the light 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 light 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 Light.

The guide vane anti-ice caution light (figure 1-19) comes on whenever the engine guide vane anti-ice valves are open. This light is powered by the primary bus, and operation of the bulbs in the light 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 light 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. (Set as desired.)

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 takeoff and landing 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.

*F-100D-91 Airplanes and F-100F Airplanes

†F-100D-86 Airplanes AF56-3407 through -3463, F-100D-91 Airplanes not changed by T.O. 1F-100D-651 and F-100F Airplanes

WARNING

The cockpit temperature should be maintained at the highest possible heat consistent with pilot comfort, during takeoff, 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 heat switch – ON. The engine thrust setting should be at, or above, 83% rpm.

WARNING

Under some icing conditions, particularly at high altitude, sufficient 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 and possible damage to the windshield, 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 takeoff, 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.
5. Cockpit pressure selector switch – As desired after takeoff. After takeoff, 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.

*F-100D-91 Airplanes, and F-100F-11 and later airplanes

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.)

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 III.

ELECTRONIC EQUIPMENT COMPARTMENT COOLING SYSTEM.

The forward electronic equipment compartment is cooled by air discharges from the cockpit and by ram air from the engine inlet duct. On F-100F Airplanes, the aft electronic equipment compartment is cooled by ram air from the engine inlet duct or by engine compressor bleed air supplied through a cooling turbine. Air to the aft electronic 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, when the volume and temperature of the ram air do not provide proper cooling for the forward and aft 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 compartment is cooled by air from the equipment cooling turbine.

On F-100F Aircraft, if the aft electronic equipment compartment cooling turbine fails, ram air is automatically supplied to cool the 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 over-heat 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.)

Equipment Air Overheat Caution Light.

A placard-type caution light (figure 1-19) comes on to read "EQUIP AIR OVERHEAT" when an over-heat condition exists in the aft electronic equipment compartment. Illumination of the light indicates possible failure of the aft electronic equipment compartment cooling turbine, failure of the turbine control system, or that the ram air is not capable of cooling the compartments. The caution light is powered by the primary bus, and bulbs within the light 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.

COMMUNICATION AND ASSOCIATED ELECTRONIC EQUIPMENT.

TABLE OF COMMUNICATION OF ASSOCIATED ELECTRONIC EQUIPMENT.

See figure 4-5. See figure 4-6 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.

COMMUNICATION AND ASSOCIATED ELECTRONIC EQUIPMENT

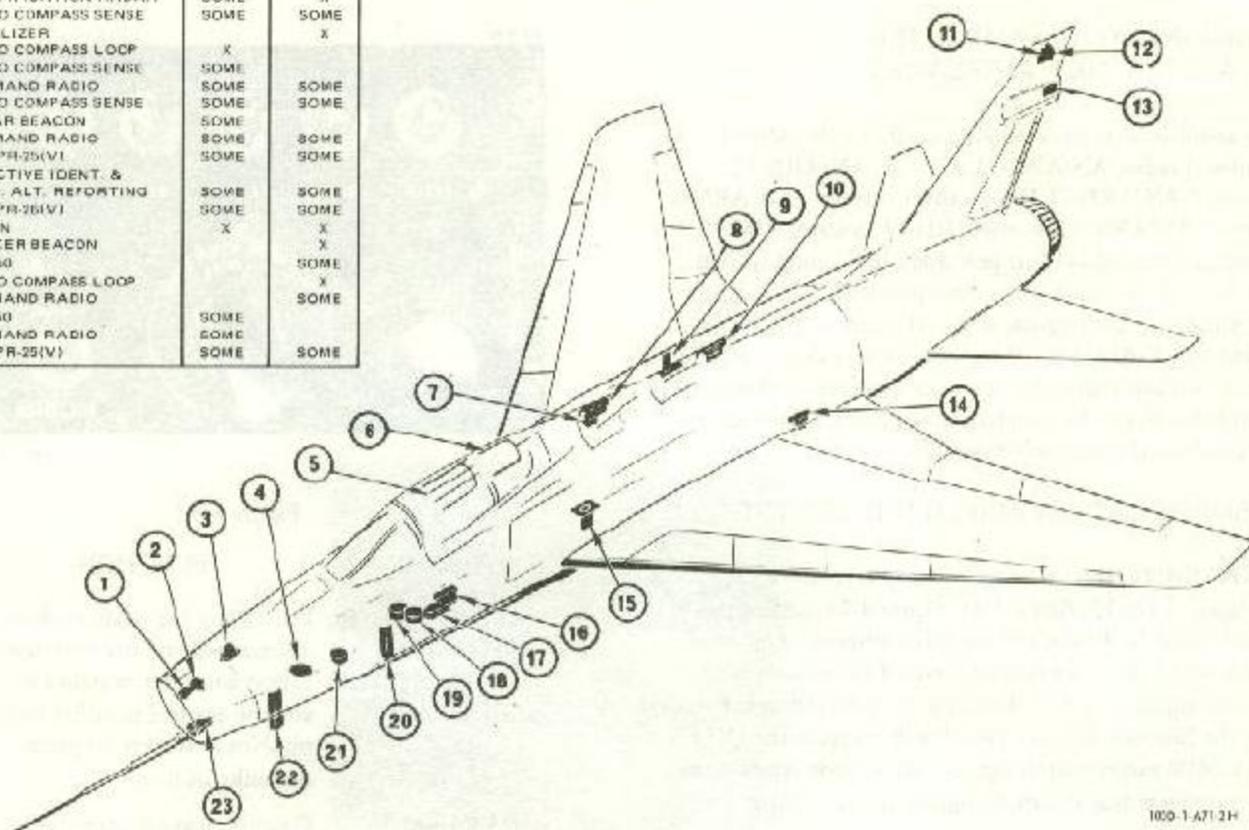
TYPE	DESIGNATION (AN)	FUNCTION	RANGE	LOCATION
UHF COMMAND RADIO	ARC-34	TWO-WAY VOICE COMMUNICATION	LINE OF SIGHT	LEFT CONSOLE
RADIO COMPASS	ARN-6	RECEPTION OF VOICE AND CODE COMMUNICATION; POSITION FINDING; HOMING	20 TO 200 MILES, DEPENDING ON FREQUENCY AND TIME OF DAY	RIGHT CONSOLE
AUTOMATIC* DIRECTION FINDING	ARA-25 ARA-50	RECEIVES HOMING SIGNALS FOR AIR RE FUELING RENDEZVOUS	LINE OF SIGHT	CONTROLLED BY AN/ARC-34 CONTROL PANEL
TACAN	ARN-21 ARN-72*	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
AIM SYSTEM	APX-72	SELECTIVE IDENTIFICATION AND AUTOMATIC ALTITUDE REPORTING	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-160	RADAR COUNTER-MEASURES		RIGHT CONSOLE
SEEK SILENCE SYSTEM*		VOICE CODE	LINE OF SIGHT	LEFT CONSOLE
RADAR BEACON SYSTEM		RADAR TRACKING	LINE OF SIGHT	RIGHT CONSOLE
RHAW SYSTEM*	ARP-25(V) APR 26(V)	RADAR HOMING AND WARNING	(CONFIDENTIAL)	INSTRUMENT PANEL

*Some airplanes

Figure 4-5

ANTENNAS

	F-100D	F-100F
1. GLIDE SLOPE		X
2. SIGHT RADAR	X	X
3. IDENTIFICATION RADAR	SOME	
4. IDENTIFICATION RADAR	SOME	X
5. RADIO COMPASS SENSE	SOME	SOME
6. LOCALIZER		X
7. RADIO COMPASS LOOP	X	
8. RADIO COMPASS SENSE	SOME	
9. COMMAND RADIO	SOME	SOME
10. RADIO COMPASS SENSE	SOME	SOME
11. RADAR BEACON	SOME	
12. COMMAND RADIO	SOME	SOME
13. AN/APR-25(VI)	SOME	SOME
14. SELECTIVE IDENT & AUTO. ALT. REPORTING	SOME	SOME
15. AN/APR-26(V)	SOME	SOME
16. TACAN	X	X
17. MARKER BEACON		X
18. AHA-50		SOME
19. RADIO COMPASS LOOP		X
20. COMMAND RADIO		SOME
21. AHA-50	SOME	
22. COMMAND RADIO	SOME	
23. AN/APR-25(V)	SOME	SOME



1000-1-A71-2H

Figure 4-6

TRANSFER BUTTONS.

Momentarily pressing this button (24, figure 1-15; 21, figure 1-18; figure 1-29) 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 AM-843/AIC-10 communication amplifier is connected electrically to the AN/ARC-34 command radio. AN/ARN-6 receiver, AN/ARN-21 receiver, AN/ARN-72 receiver,* RHAWS system, landing gear audible warning system, AIM-9B/E missile system, and microphone and headsets. Powered by the primary bus, the amplifier has an interphone for cockpit and ground crew intercommunications when the airplane is on the ground.

*Some airplanes

Interphone Switch.

The interphone switch (16, figure 1-10; 17, figure 1-11) is spring-loaded at OFF. When held at MIC, the switch allows the crew chief to be in direct communication with the cockpit during preflight or postflight operations. A receptacle in the nose wheel well is for the maintenance headset.

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-72 receiver,* AN/ARN-31 ILS localizer receiver, AN/ARN-6 receiver, AN/ARN-32 receiver, RHAW system, AIM-9B/B missile system and landing gear audible warning system. The AN/AIC-10 amplifier system powered by the primary bus, amplifies radio signals sent and received and is controlled by a C-824/AIC-10 panel in each cockpit. In addition, it furnishes interphone service between cockpits and interphone service to maintenance personnel through a receptacle in the nose wheel well.

COMMUNICATION AMPLIFIER CONTROLS.

MIXER SWITCHES. Five switches (29, figure 1-15; 30, figure 1-16; 22, figure 1-18; figure 4-7) control the mixed-signal facility of the amplifier system. Any or all of the switches can be moved forward for reception of a selected signal, or aft to eliminate the selected signal, except that the function selector switch will override the INTER and COMM mixer switch signals. Mixer switch positions and corresponding reception signals are as follows:

POSITION	RECEPTION
INTER	From other cockpit
COMM	Command radio
TACAN	TACAN
ADF	Radio compass
ILS	Localizer and marker beacon

FUNCTION SELECTOR SWITCH. This switch (figure 4-7) controls individual transmission and reception of audio signals. Switch positions and functions are as follows:

COMMUNICATION AMPLIFIER CONTROL PANEL



F-100F-1-A71-8A

Figure 4-7

POSITION	FUNCTION
CALL. (must be held at CALL; returns to INTER when released.)	For calling the other cockpit, independent of any communication amplifier switches or volume control in either cockpit. Not necessary to press the mike button.
INTER (both cockpits)	Communication between cockpits when the mike button is pressed.
COMM INTER	Command radio signals are received. With the INTER mixer switch forward, a "hot mike" condition is provided for interphone operation. Command radio transmission requires use of the mike button. (Refer to UHF Command Radio AN/ARC-34 in this section.)
COMM	Command radio signals are received and transmitted when the mike button is pressed.

*Some airplanes

NOTE

When COMM INTER or COMM positions are selected, command radio signals are heard, regardless of the position of the COMM mixer switch.

"NORMAL - AUX-LISTEN" SWITCH. This communication amplifier switch (figure 4-7) 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.

- The warning signal for the landing gear and the headset tone for the AIM-9B/E missiles are not audible when this switch is at AUX LISTEN.

VOLUME CONTROL KNOB. Turning the communication amplifier volume control knob (figure 4-7) counter-clockwise 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 1-21) 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.
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 airplanes.

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).

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 4-8) permits selection of 20 preset channels. In addition, operating frequencies can be selected manually without disturbing the preset channel

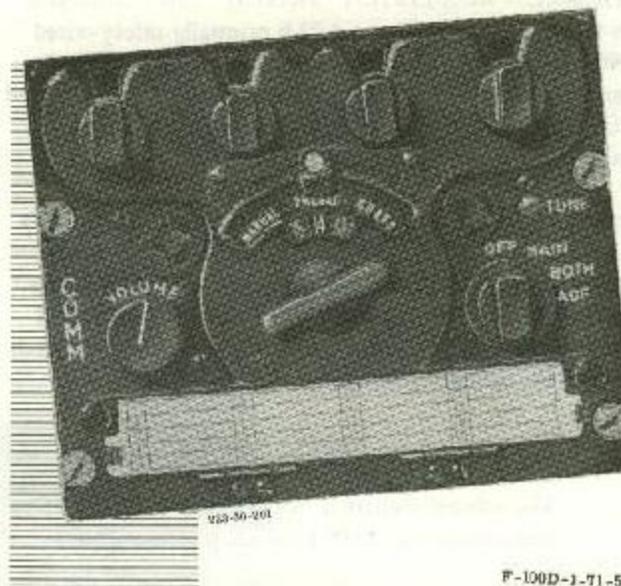
COMMAND RADIO CONTROL PANEL

Figure 4-8

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.

When an E3401 ground-crew-to-cockpit interphone package is connected to the maintenance receptacle in the nose wheel well, communication is possible between the cockpit and maintenance personnel. On F-100D Airplanes, the command radio receiver may be monitored but broadcast transmission cannot be made while the ground interphone package is connected or if the interphone switch is at MIC.

On F-100F Airplanes, when the package is connected, the communication amplifier function selector switch in the cockpit in control must be at INTER to prevent broadcast transmission of interphone conversation. (The function selector switch in the other cockpit can be at either INTER or COMM INTER.) The function selector switch in the cockpit in control must be returned to COMM or COMM INTER to restore the command radio to normal operation when the ground interphone package is disconnected.

Command Radio Controls and Indicator.

CHANNEL SELECTOR SWITCH. The channel selector switch (figure 4-8) 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 4-8) from OFF turns the command radio on. (A warm-up period of about 1 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 operable only with the ADF system. On airplanes without the ADF system, when the switch is at ADF, the No. 1 pointer of the radio magnetic indicator or the bearing-distance-heading indicator is 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 4-8.) 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 4-8) 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 4-8) 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 (50, figure 1-6; 51, 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 at PRESET, two of the indicator windows are used to display the number of the preset command radio channel. When the selector control is at MANUAL, the four indicator windows display the frequency (in megacycles) of the selected channel. With the selector control at GUARD, the two center windows show the letters "GD." 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 takeoff, 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, moving 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, and turn function switch to MAIN. This will prevent unequal or garbled reception by cutting out the guard receiver that operates when the function switch is at BOTH.

NOTE

Transmission should not be made on emergency (distress) frequency channels except for emergency purposes.

- This procedure places the equipment in condition to receive. Transmission on the same frequency is obtained by pressing 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. Move 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-50 AUTOMATIC DIRECTION-FINDING SYSTEM — AIRPLANES CHANGED BY T.O. 1F-100-969.

The AN/ARA-50 is an automatic direction-finding (ADF) and range-finding (TACAN) system for homing on UHF signals. This system, powered by the primary bus, operates within the frequency range of the AN/ARC-34 command radio receiver and is controlled through the function switch (figure 4-8) on the AN/ARC-34 control panel. The system automatically indicates the bearing of UHF signals emanating from selected ground stations, UHF radio-equipped airplanes, or other UHF radio-equipped sources, allowing the use of these frequencies for homing and rendezvous. The AN/ARA-50 system can be used with the AN/ARN-72 TACAN system to automatically indicate range of the UHF signals emanating from a preselected airplane. When the AN/ARC-34 function switch is turned to ADF, a change-over relay in the system disconnects the AN/ARN-6 radio compass signal that is sent to the radio magnetic indicator, master heading indicator, or bearing-distance-heading indicator, and connects, in its place, a directional signal from

the AN/ARA-50 ADF system. Relative bearing is indicated by the No. 1 (ADF bearing) pointer on the indicator. Range indication is shown on the AN/ARN-72 TACAN range indicator. To facilitate the reception of UHF signals for ADF bearings, a flush-type antenna is installed in the lower surface of the fuselage centerline.

Operation of AN/ARA-50 Automatic Direction-finding System.

With the command radio on and warmed up, select a common frequency with the ground station or airplane to be homed on. Turn the AN/ARC-34 function switch to ADF, and the AN/ARN-72 TACAN function switch to A/A. The ADF bearing pointer will move in response to the UHF signal to indicate the bearing, and the TACAN range indicator will indicate the range to the ground station or to the airplane.

NOTE

For normal UHF communication, the function switch should be returned to MAIN or BOTH. However, transmission is possible when the switch is at ADF.

SEEK SILENCE SYSTEM — AIRPLANES CHANGED BY T.O. 1F-100D-630 AND T.O. 1F-100F-566.

The seek silence system permits either normal operation of the AN/ARC-34 command radio or decoding and coding of voice communications through the command radio. The decoding and coding capability prevents interception of messages when required. The system is powered by the primary bus.

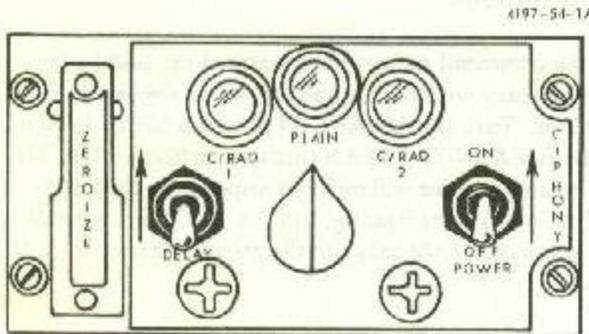
Power Switch.

When the power switch (figure 4-9) is moved from OFF to ON, power is applied to the seek silence system. The command radio can be operated in the normal manner with the power switch at OFF.

Function Switch.

This switch (figure 4-9) controls decoding and coding of command radio voice reception and transmission. With the switch at PLAIN, normal operation of the command

SEEK SILENCE CONTROL PANEL



LEFT CONSOLE, INBOARD OF THROTTLE QUADRANT

Figure 4-9

radio is available, and only uncoded reception and transmission possible. With the switch at C/RAD 1, the system decodes incoming voice communications, and codes outgoing voice communications through the command radio. The C/RAD 2 position has no function in these airplanes. A mechanical stop prevents the switch from being moved to this position.

Function Indicator Lights.

Three dimmable, press-to-test type lights (figure 4-9) indicate the position selected by the function switch. With power applied to the system, the left (green) light comes on when the C/RAD 1 position of the function switch is selected; the middle (amber) light comes on when the PLAIN position of the function switch is selected; the right (green) light is inoperative on these airplanes.

Zeroize Switch.

The zeroize switch (figure 4-9) is guarded in the normal, aft (OFF) position. If it becomes necessary to eject, the guard should be raised and the switch held momentarily

at the forward (ON) position. This zeros out the ground set codes in the seek silence system.

Retransmit Switch.

This switch (figure 4-9) has no function in these airplanes. The switch should always be aft (OFF), regardless of the position of the function switch.

Operation of Seek Silence System.

1. Turn on command radio. (Refer to Normal Operation of Command Radio in this section.)
2. Move power switch to ON.
3. Turn function switch to PLAIN and establish communications through normal transmission procedures where possible.
4. Turn function switch to C/RAD 1 and listen for a steady unbroken tone in the headphones for approximately 2 seconds, followed by a double-pitched broken tone. If a prolonged steady tone is heard, it indicates an improper code setting or equipment malfunction, and the function switch should be turned to PLAIN and the power switch should be turned to OFF.
5. Press and hold mike button for several seconds, then release. The double-pitched broken tone should stop and no further sound will be heard in the headphones. If the broken tone continues, press mike button again and hold for several seconds. If the broken tone continues after three such attempts to clear it, move function switch to PLAIN and power switch to OFF.
6. Press and hold mike button. Wait 1/2 to 2 seconds for a single beep tone in the headphones. If beep tone is not heard, press mike button again and wait 1/2 to 2 seconds. If beep tone still is not heard, move power switch to OFF and then to ON, and repeat steps 5 and 6. If this fails to produce the beep tone, turn function switch to PLAIN and power switch to OFF.
7. When beep tone is heard, begin transmission.

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, master heading, or bearing-distance-heading indicator. The radio compass control panel is on the right console. (See 27, figure 1-10; 28, figure 1-11; 28, figure 1-15; 29, figure 1-16; 18, figure 1-18.) 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 forward dorsal fairing on F-100D-81 through F-100D-86 Airplanes. On F-100D-91 Airplanes and F-100F-11 and later airplanes, the sense antenna is in the aft dorsal fairing. 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 4-6.) The radio compass is powered by the secondary bus.

Description and Operation of Radio Compass.

Refer to Instrument Flying Manual, AFM 51-37.

COURSE INDICATOR.

Signals from the TACAN receiver, or glide slope or localizer receiver are directed into the course indicator (44, figure 1-6; 32, figure 1-7; 30, figure 1-12; 31, figure 1-13). 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 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. A glide slope indicator is operated by the glide slope receiver on F-100F airplanes for descent guidance during ILS operations. On F-100D airplanes, the glide slope indicator 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 displays 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. On F-100F airplanes, this light is connected to the marker beacon

receiver and comes on when the receiver detects a 75-megacycle signal. The light is the press-to-test type. The course indicator has "OFF" flags that become visible when 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 (41, figure 1-6; 32, figure 1-12; 29, figure 1-13) receives heading information from the J-4 compass system. This is reflected on a rotating compass card that provides a magnetic heading displayed against a fixed reference marker at the 12 o'clock position on the dial. Signals from the radio compass receiver and from the 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.

MASTER HEADING INDICATOR — F-100F-20 AIRPLANES.

The master heading indicator (7, figure 1-6; 4, figure 1-12) receives heading information from the J-4 compass system. The compass card on the indicator rotates to reflect the information from the J-4 system to show the magnetic heading of the airplane under the top index. A knob on the face of the instrument rotates the heading reference index. The master heading indicator functions as a standard radio magnetic indicator. The No. 1 (ADF bearing) pointer reflects the radio compass signals to show magnetic bearing to the transmitter antenna. (These airplanes have provisions only to utilize an AN/ARA-25 direction finding system and UHF command radio signals to the ADF bearing pointer when in that configuration.) TACAN signals drive the No. 2 (TACAN bearing) pointer to read magnetic bearing to the TACAN signal transmitter.

BEARING-DISTANCE-HEADING INDICATOR — SOME F-100D AIRPLANES. AIRPLANES NOT CHANGED BY T.O. 1F-100D-648.

This indicator (8, figure 1-7) is powered by the primary bus and the 3-phase ac instrument bus. The indicator 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. A memory index (a small ring) can be 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 No. 2 (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. The counters are inoperative and remain at zero. An OFF flag appears on the face of the indicator when power is interrupted.

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 pointer on the heading indicator (7, figure 1-6; 4, figure 1-12; 2, figure 1-13) and compass card on the radio magnetic indicator or master heading indicator, or bearing-distance-heading indicator 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 (23, figure 1-10; 24, figure 1-11; 9, figure 1-15; 23, figure 1-16) is not in the rear cockpit.

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.

- After the gyro reaches operating speed, the pointer or card should be checked against the magnetic compass (deviation corrected).

CAUTION

Two minutes must elapse when switching from the magnetic mode to the directional gyro mode and back to the magnetic mode. This is for cooling of the thermal relay that controls the fast-slow cycle. If the relay is not cooled to permit another complete fast-slow cycle, the indicator may stop at an erroneous reading.

NOTE

Straight and level flight must be maintained for 15 seconds before attempting to fast-slow the compass indicator. This should permit the rate-switching gyro to restore the magnetic slaving signal to the compass system and allow the compass indicator to synchronize with the correct magnetic heading.

Description and Operation of J-4 Compass System.

Refer to Instrument Flying Manual, AFM 51-37.

TACAN - AN/ARN-21 (AN/ARN-72, SOME AIRPLANES CHANGED BY T.O. 1F-100-969).

The TACAN system is a navigational aid, capable of providing bearing and slant range in nautical miles to a surface beacon. Some airplanes changed by T.O. 1F-100-969 have an AN/ARN-72 TACAN system. The AN/ARN-72 TACAN is identical to the AN/ARN-21 TACAN, except the more powerful receiver-transmitter on the AN/ARN-72 functions as an airborne interrogator-responder to provide range information to other AN/ARN-72 TACAN equipped airplanes as well as slant range to surface beacons. The control panels are identical, except the function switch on the AN/ARN-72 TACAN panel has an additional position labeled "A/A" (air-to-air). After the desired TACAN channel is selected, the function switch should be turned to A/A. Following a 2-minute warm-up, the range indicators should display range to the target AN/ARN-72. The TACAN system is powered by the secondary bus and the main ac bus. The

This equipment functions so as to utilize existing Radio Magnetic Indicator (RMI) and Course Indicator (CI) instrumentation. The RMI #2 needle is always reserved for TACAN bearing.

With TACAN mode selected the CI provides TACAN steering and the RMI #1 needle is available for ADF use.

With VOR/ILS mode selected the CI provides VOR steering and the RMI #1 needle gives VOR bearing information when a VOR frequency is selected on the control panel. With an ILS frequency selected the CI provides both localizer and glide slope steering and the RMI #1 needle becomes inoperative. (See Fig 4-11.)

The receivers are powered by the DC secondary bus and the instrumentation by the AC instrument bus.

GLIDE SLOPE RECEIVING SYSTEM, GS-100B RECEIVER.

The glide slope system receives signals from a transmitter located near an airport runway. The signals establish a glide slope which the pilot follows when making an instrument approach to the runway. An indicator on the instrument panel shows whether the airplane is above, below, or on the glide slope. The glide slope system operates in conjunction with a localizer system in a unified ILS (instrument landing system). (The localizer shows whether the airplane is to the right or to the left of the airport runway). There are 40 glide slope frequency channels available in the frequency range of 329.15 to 335.0 MHz. In addition to glide slope information, this receiver receives marker beacon transmissions to give the pilot distance from the runway threshold. This information is presented by illumination of a "MARKER" lamp on the course indicator.

LOCALIZER RECEIVING SYSTEM, NR-106A RECEIVER.

The localizer system receives radio signals from a transmitter located near an airport runway. The radio signals establish an approach leg, which the pilot follows when making an instrument approach to the runway. An indicator on the instrument panel shows whether the airplane is to the left or right or in the center of the localizer leg. The localizer system operates in conjunction with a glide slope system in a unified ILS (instrument landing system). An ILS/TACAN change switch controls the selection of TACAN or ILS to operate the course indicator. There are 40 localizer frequency channels available in the frequency

range of 108.00 through 117.95 MHz. This receiver also contains the VOR function, yielding a possible selection from 160 VOR frequency channels. The VOR signal is presented on the radio magnetic indicator #1 needle when the ILS mode is selected.

CONTROL PANEL. (Fig. 4-10)

The NAV control panel is a switch and indicator unit for control of remote power, audio volume, and frequency selection. It consists of three concentric knobs. One knob is used for remote power control and adjustment of audio volume. The other knobs are used for frequency selection. The NAV control panel is used to control both the NR-106A automatic navigation receiver and the GS-100B glide slope receiver is automatically tuned to the correct glide slope frequency. Selection of a given localizer frequency correctly pairs glide slope and localizer frequencies.

COURSE INDICATOR.

The ID-351/ARN course indicator is on the instrument panel. The GSI shows deviation from the glide slope. The red flag over the GSI retracts out of sight when the signal received is strong enough to properly operate the indicator, ID351. The CDI shows left or right deviation from the localizer path. The red flag over CDI retracts when the localizer signal is strong enough to operate the indicator, ID351. The indicator light, in the upper right corner, is operated by the marker beacon system.

WARNING

If the VOR/ILS receiver is inadvertently tuned 50 KHz above or below the correct frequency, the course flag may disappear from view and the correct station identifier may be heard, but the course information will be unreliable.

WARNING

This system was installed for use as an ILS only. The VOR portion is functional at low altitudes, but marginal above 20,000 and unreliable above 25,000.

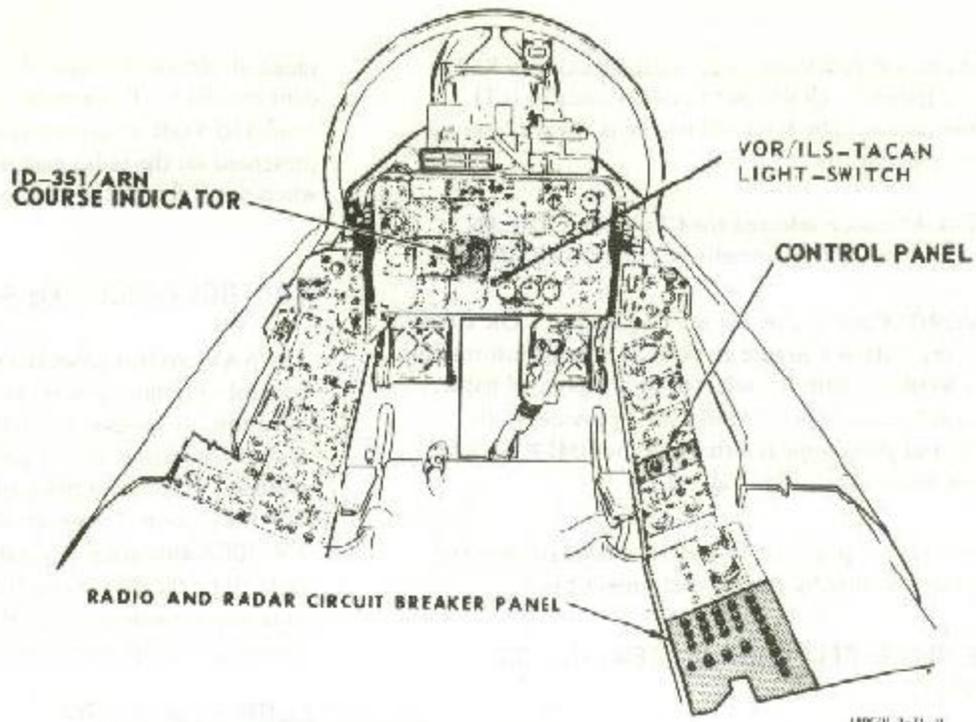


Figure 4-10. Instrument Landing System Equipment Location

**COCKPIT INSTRUMENT INDICATIONS
FOR TACAN VS. VOR/ILS MODE SELECTION.**

MODE		INSTRUMENT INDICATIONS*	
		ID-250 RMI	ID-351 CI
TACAN		① ADF Course	CDI - TACAN Steer
		② TACAN Course	GSI - "OFF" and Centered
VOR / ILS	VOR FREQ.	① VOR Course	CDI - VOR Steer
		② TACAN Course	GSI - "OFF" and Centered
	ILS FREQ.	① Frozen	CDI - Localizer Steer
		② TACAN Course	GSI - Glide Slope Steer

* ① Number 1 pointer on RMI

② Number 2 pointer on RMI

CDI - Vertical bar of CI

GSI - Horizontal bar of CI

Figure 4-11.

control panel is on the right console. (See 24, figure 1-10; 26, figure 1-11; 24, figure 1-15; 26, figure 1-16; 17, figure 1-18.) A bearing pointer (radio magnetic indicator, master heading indicator, or bearing-distance-heading indicator) indicates magnetic bearing to the station. The audio signal is directed through the AN/AIC-10 communication amplifier. On F-100F airplanes, the radio control transfer system determines which cockpit has control of the TACAN system.

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.

CAUTION

Do not select channels above 126 or below 01 because of possible damage to the equipment.

Operation of AA Feature of AN/ARN-72.

In order to use the AA feature, the channelization of the AN/ARN-72 (other aircraft) must be known and tuned to a channel that will allow you to set in a 63 channel differential and select AA on the function switch. Range only should be available to the target aircraft. (Bearing is available through the AN/ARA-50 UHF/DF.)

AIRBORNE TRANSPONDER, AN/APX-72 (IFF)

The AIMS system provides capabilities comparable to the IFF/SIF (AN/APX-25) equipment, and, in addition, features an expanded coding identification system, an aircraft altitude automatic reporting system and a mode 4 (encrypted) IFF capability. The mode 4 capability designates the system as the Mark XII. The AIMS system, which utilizes an AN/APX-72 receiver/transmitter (transponder), is used to automatically identify the airplane in response to coded interrogations. Depending on the interrogation mode, the reply is transmitted in modes 1, 2, 3/A, 4, or airplane altitude reporting in mode C.

The AIMS system also functions to provide identification of position (I/P), special position identification (SPI), and emergency transmission. The I/P function, which is used in modes 1, 2, and 3/A only, provides a coded reply that is initiated by the pilot to enable the interrogation station to identify the airplane within a group of airplanes. The SPI

function (in mode C) enables Radar Air Traffic Control to discriminate airplanes above 30,800 feet from those below that altitude. The emergency function can be selected by the pilot or is initiated automatically during seat ejection to provide a coded reply to an interrogation to enable rapid identification of an airplane in distress. The altitude automatic reporting feature incorporates an altitude computer with an encoder and a servoed altimeter.

During AN/ARN-20 (TACAN) transmissions, blanking pulses disable all modes of AIMS system operation.

The AIMS system incorporates a means of self-test in modes 1, 2, 3/A, and C. The system incorporates an IFF caution light and an IFF antenna selector switch. The AIMS system is powered by the primary bus and the main 3-phase ac bus. (See figure 4-12.)

AIMS System Control Panel.

The AIMS system control panel is located on the right console. (See figures 4-12 and 4-13.) On F-100F airplanes, the control panel is in the front cockpit only. Controls on the panel include the following: a master switch, mode selection (and test) switches (for modes 1, 2, 3/A, and C), a motor switch (for modes 1, 2, 3/A, and C), two code selectors for mode 1 and four code selectors for mode 3/A, an identifier (pulse) switch, a mode 4 enable switch, and a mode 4 code select switch. The rotary type master switch is moved from OFF to STDBY to turn the system on; NORM or LOW position selects receiver sensitivity, and the EMER position activates emergency operation. The master switch knob must be pulled out to be moved to EMER. The mode selection (and test) switches M-1, M-2, M-3/A, and M-C, have a forward (momentary) TEST position, a center ON position, and an aft OUT position. Holding each mode selection switch at TEST initiates a self-test of each respective mode provided the airborne test set is installed. A green TEST light illuminates to indicate proper operation of each tested mode during the self-test. The test light also comes on when the (radiation) monitor switch (marked RAD TEST-OUT-MON) is placed at MON (monitor) if the transponder replies properly to interrogations in modes 1, 2, 3/A, or C.

The RAD TEST position is utilized by maintenance personnel during ground checkout. The two mode 1 selectors provide 32 possible code selections and the four mode 3/A selectors provide for 4096 code selections. The identifier (pulse) switch enables transmission of identification of position (I/P) signals in response to interrogations in modes 1, 2, or 3/A, for 15 to 30 seconds. Transmission of I/P signals can be accomplished in three ways: when the switch is momentarily placed at IDENT, or when the switch

All data on pages 4-27 and 4-28, including figures 4-10 and 4-11, deleted.

AIMS SYSTEM COCKPIT COMPONENTS-F-100D & F-100F

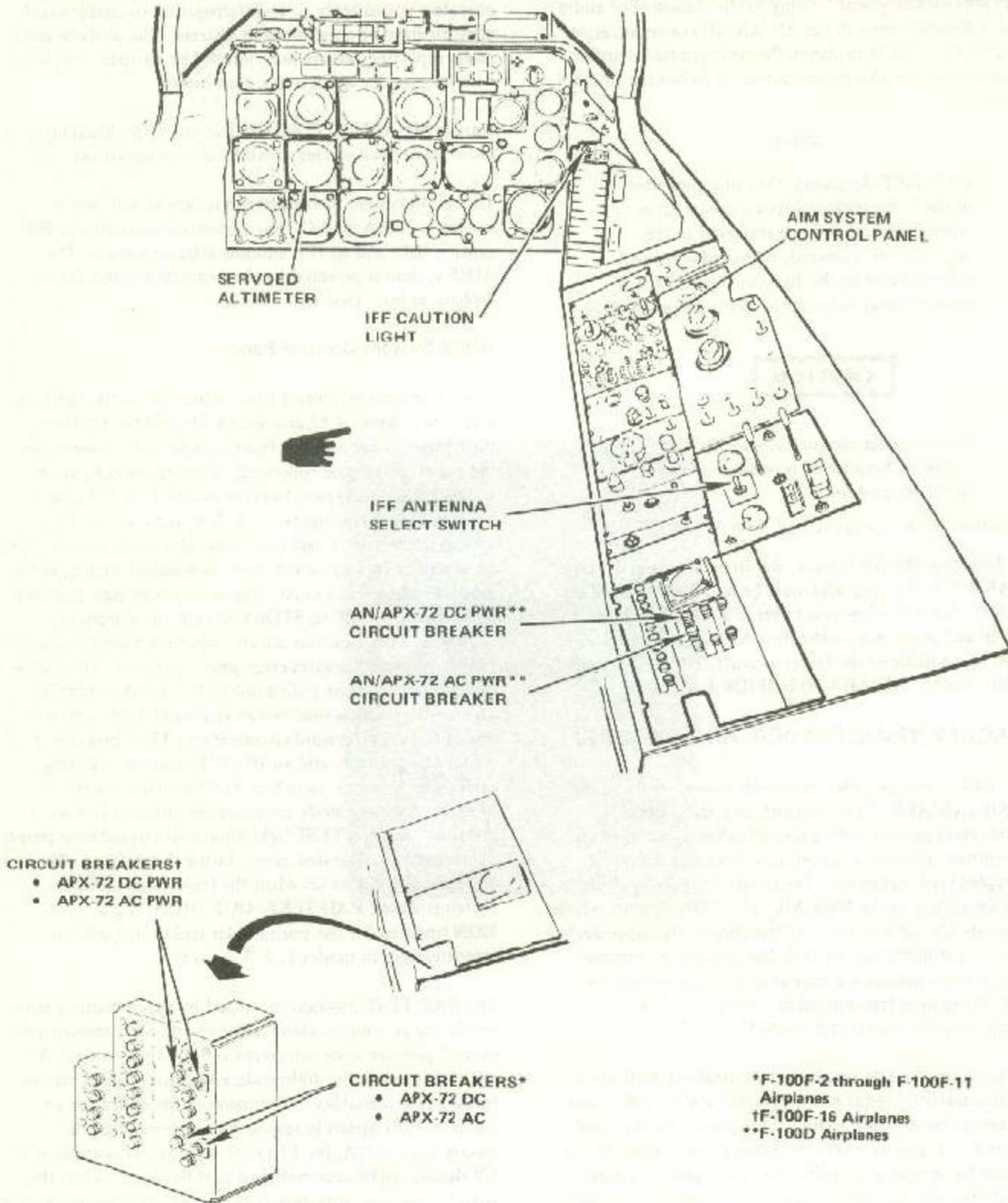


Figure 4-12

AIMS SYSTEM CONTROL PANEL



Figure 4-13

is at MIC and either the microphone button is momentarily pressed, or the command radio tone button is pressed (while the command radio is on). On F-100F airplanes, the communications amplifier AN/AIC-10 function selector switch also must be at COMM or COMM INTER when the microphone button is pressed in order to transmit I/P response. Mode 4 is selected by placing the mode 4 enable switch from OUT to ON. Mode 4 codes are preset in the mode 4 computer prior to the mission by the use of a code changer key. The mode 4 CODE selector has the following positions: A and B to select either code A or code B; a HOLD position to provide a means of retaining the mode 4 code for an additional flight (unless intentionally retained, the code is automatically returned to zero when power is removed after landing); and a ZERO position to enable manually zeroizing the mode 4 code. The mode 4 code selector knob must be pulled out to be moved to ZERO. The mode 4 REPLY light (green) comes on when the receiver/transmitter responds properly to a mode 4 interrogation if the audio/light switch has been moved from OFF to AUDIO or LIGHT. (There is no audio signal provided in the present circuit.)

IFF Antenna Selector Switch.

The IFF ANTENNA SELECT switch is located on the air conditioning control panel on the right console (figure 4-4). On F-100F airplanes, the IFF ANTENNA SELECT switch is in the front cockpit only. The switch is positioned to TOP to select only the upper antenna, or BOTTOM to select only the lower antenna. When the switch is at BOTH, the AIMS system automatically cycles alternately between the upper and lower antennas. (See figure 4-6.)

IFF Caution Light.

The IFF CAUTION light is located above the placard type indicator lights on the right forward console (figure 4-12). On F-100F airplanes, the caution light is in the front cockpit only. The amber caution light illuminates whenever an interrogation is processed through the mode 4 computer and the AIMS system does not respond with a proper reply. The light also comes on whenever mode 4 codes are zeroized. If a mission is flown without the mode 4 computer installed, the IFF caution light will not function.

AIMS System Normal Operation and Preflight Check.

The AIMS system control panel switches are positioned as follows for normal operation of the AIMS system:

1. Master switch – STBY.

NOTE

The system requires approximately a 1-minute warm-up after the master switch is at STBY.

2. Radiation monitor switch – OUT.
3. Identifier (pulse) switch – OUT.
4. Audio/light switch – LIGHT.
5. Mode 4 code select switch – A.
6. All remaining toggle switches – ON.
7. Modes 1 and 3/A code selectors – As briefed.
8. Master switch – NORM.

After completing the foregoing steps, the AIMS system preflight check is accomplished by continuing as follows:

9. M-1, M-2, M-3/A, and M-C mode selection (and test) switches – OUT.
10. M-1 mode selection (and test) switch – TEST (momentarily).

NOTE

Test light should come on. When switch is returned to OUT, the light should go out.

11. Repeat the preceding step for M-2, M-3/A, and M-C mode selection (and test) switches, one at a time. The test light indication should be the same.

12. At completion of check, place M-1, M-2, M-3/A, and M-C mode selection (and test) switches – ON.

After landing, to retain mode 4 codes, momentarily place mode 4 select switch at HOLD before engine shutdown.

AIMS System Emergency Operation.

Emergency operation can be initiated by setting the master switch to EMER or will be initiated automatically if the pilot ejects from the airplane. In either case, the system transmits a coded reply to an interrogation to rapidly identify the airplane in distress. When the master switch is placed at EMER, the system transmits distinct emergency coded replies in modes 1, 2, and 3/A. In addition, modes C and 4 are enabled to provide coded replies to interrogations. All modes function regardless of the position of control panel individual mode switches. Mode 3/A transmits the emergency reply in code 7700 regardless of the mode 3/A code selector settings. In case of ejection, the emergency function is enabled in modes 1, 2, and 3/A, regardless of the positions of mode selection switches on the control panel and will function even with the master switch at STBY. The mode 4 computer is automatically zeroized in case of ejection.

**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. 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.

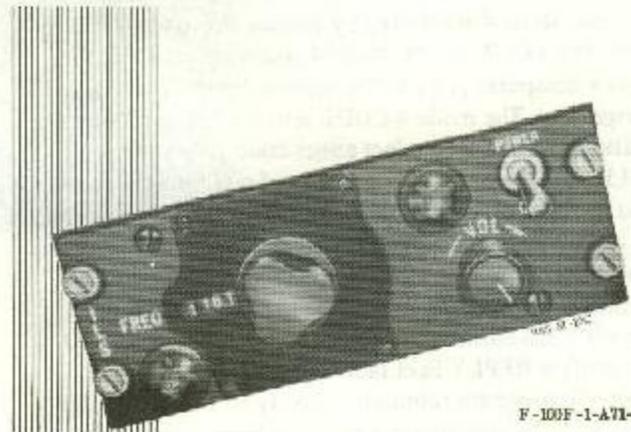
ILS Control Panel.

The ILS frequency is selected by rotating the frequency selector knob on the ILS control panel (23, figure 1-15; 24, figure 1-16; 16, figure 1-18; 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 Switch.

The TACAN-ILS change-over switch on the radio transfer control panel (24, figure 1-15; 21, figure 1-18) or on the TACAN-ILS change-over panel (25, figure 1-16), determines which of the two systems will furnish information to the course deviation indicator on the course indicator.

ILS CONTROL PANEL



F-100F-1-A71-4

Figure 4-14

A selector relay in the system is energized by secondary bus power when the switch is at TACAN. The selector relay is de-energized when the switch is at ILS. This ensures ILS capabilities in case of electrical power loss to the TACAN-ILS selector relay.

TACAN-ILS Light – F-100F-2 Through F-100F-16 Airplanes.

This placard-type light (28, figure 1-6; 31, figure 1-12; 24, figure 1-13) is powered by the secondary bus. The light comes on to read "TACAN" or "ILS," depending upon the position of the TACAN-ILS change-over switch, to give visual verification of which system is in control of the course deviation pointer on the course indicator. The bulbs within the light can be tested by the indicator light test circuit.

TACAN-ILS Lights – F-100F-20 Airplanes.

These placard-type lights, on the TACAN-ILS change-over panel (25, figure 1-16) are powered by the secondary bus. The TACAN light will come on to read "TACAN," or the ILS light will come on to read "ILS," depending upon the position of the TACAN-ILS change-over switch, to give visual verification of which system is in control of the course deviation pointer on the course indicator. Bulbs in the lights can be tested by the indicator light test circuit.

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 (47, figure 1-6; 35, figure 1-12; 33, figure 1-13) on the course indicator. The marker beacon receiver is automatically turned on when the secondary bus is energized.

QRC-160 SYSTEM.

The QRC-160A-1 (AN/ALQ-71), the QRC-160A-2 (AN/ALQ-72), or the QRC-160A-8 (AN/ALQ-87) electronic countermeasure pods can be carried on a type III pylon at each outboard wing station. Each pod serves a specific function in the system and includes system components, a generator to provide electrical power for the

components, a ram-air turbine for driving the generator, and the antennas. Additional information can be found in T.O. 1F-100D(I)-2-8 (classified) for the AN/ALQ-71 and 72, and in T.O. 12P-3-2ALQ87-2 (classified) for the AN/ALQ-87.

QRC-160 Systems Controls and Indicators.

The QRC-160 system controls and indicators and their functions 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-160 System.

QRC-160A-1 (AN/ALQ-71) POD. Operate system as follows:

1. Turn operate switch to STBY. This places the system in standby. The standby light should illuminate after one minute.
2. Turn operate switch to XMIT 1; if the system is operating correctly the corresponding XMIT light illuminates.
3. If a major fault is detected in the system, the overload light illuminates.
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 standby (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 under-pressure condition (below 9 psia) and the operated 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-160A-2 (AN/ALQ-72) POD. Operate system as follows:

1. Turn operate switch to STBY. This places the system in standby. The standby light should illuminate in approximately 3 minutes.

2. Turn operate switch to XMIT 1.

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 the system, the overload light illuminates.

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 standby (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 under-pressure 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-8 (AN/ALQ-87) POD. Operate system as follows:

1. Turn operate switch to STBY. This places both systems in the standby mode. The standby lights should illuminate in approximately one minute.

2. Turn operate switch to XMIT 1, if the system is operating correctly the XMIT 1 light should illuminate. On aircraft equipped with the RHAW system,

T.O. 1F-100-992 and 994 if the system is on, the XMIT 1 light illuminates only when the system is actually transmitting.

3. If a major fault is detected, within either of the operating systems, the overload light illuminates; and can be caused by either an electrical overload, under-pressure, or overtemperature in the units.

4. Depressing the reset button places the system in standby (light does not illuminate) clearing temporary faults and resets the overtemp and underpressure lockout circuits.

QRC-160 Emergency Jettison.

To jettison QRC-160 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 pods only.)

2. Press OUTBOARD (OUTBD) external load auxiliary release button. (This jettisons pods only.)

NOTE

To jettison QRC-160 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.

RADAR BEACON SYSTEM — AIRPLANES CHANGED BY T.O. 1F-100-985.

The radar beacon system increases the effective tracking range of ground radar stations, providing navigational aid and tactical air control to friendly airplanes. The system consists of an antenna (figure 4-6), a transponder (SST-181X), and a control panel. (See 21, figure 1-10; 23, figure 1-11; figure 4-16). When the transponder receives an interrogating pulse transmitted by the ground radar, it responds automatically when a coded-pulse reply many many times stronger than an ordinary reflected pulse. The interrogating source receives this reply and determines the airplane azimuth and range. The radar beacon system is powered by the tertiary bus.

RADAR BEACON CONTROL PANEL

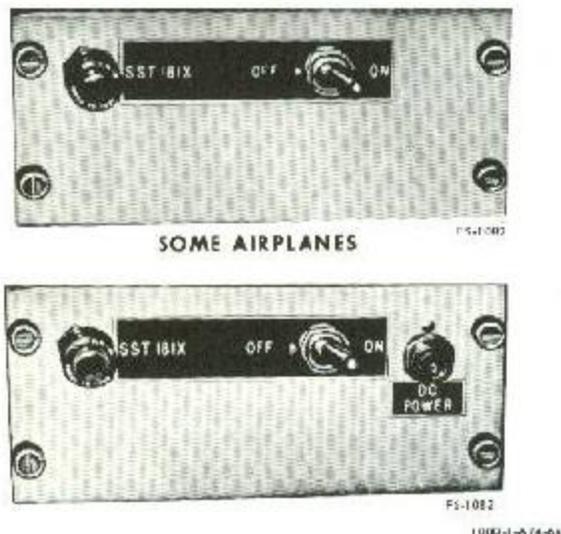


Figure 4-16

Power Switch.

The radar beacon system is fully automatic except for turning the power supply on and off. This is the function of the power switch. (See figure 4-16.) Moving the switch from OFF to ON connects tertiary bus power to the system transponder. Normally, warm-up time is from 30 to 60 seconds. If no response is received within 5 minutes after the system is turned ON, the system should be turned OFF.

Power on Light.

This amber, dimmable, press-to-test light (figure 4-16) comes on when the power switch is moved to ON, to indicate tertiary bus power is being supplied to the system transponder.

RADAR HOMING AND WARNING (RHAW) SYSTEM — AIRPLANES CHANGED BY T.O. 1F-100-992 (WIRING PROVISIONS) AND -994 (SYSTEM COMPONENTS).

See 1 and 2, figure 1-6; 8, 11, and 14, figure 1-13; and refer to Confidential Supplement, T.O. 1F-100D(1)-1-2.

LIGHTING EQUIPMENT.

EXTERIOR LIGHTING.

A position light is on each wing tip, and two are in the trailing edge of the fuel vent outlet fairing, above the rudder. The airplane has two recognition lights, one on the upper fuselage and one on the lower fuselage. Airplanes changed by T.O. 1F-100-1040 have two anticollision lights, one on the upper fuselage and one on the lower fuselage. On these airplanes, the lower recognition light is moved forward on the fuselage centerline to accommodate the lower anticollision light. (See figures 1-1 and 1-2.) 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. Some airplanes have a single floodlight in each wing. The lights (29, figure 1-1; 23, figure 1-2) face inboard and aft for illumination of the aft fuselage and empennage to facilitate visibility during night formation.

Position Light Switch.

Illumination of the position and recognition lights is controlled by a secondary-bus-powered switch. (See figure 4-17.) 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.)

Position Light Dimmer Switch — Airplanes Changed by T.O. 1F-100-1068.

Brilliance of the position and recognition lights is controlled by a secondary-bus-powered dimmer switch (not in rear cockpit). (See figure 4-17.) The switch has two positions, BRIGHT and DIM.

Anticollision Light Switch — Airplanes Changed by T.O. 1F-100-1040.

Moving the anticollision light switch, labeled "BEACON LIGHTS" (figure 4-17), to ON supplies primary bus power to a red light, and a reflector that rotates about 80 rpm. The light and reflector are housed in a streamlined enclosure on the upper and lower fuselage. These lights, masked at the forward end to prevent glare in the cockpit, provide a flash-type warning that can be seen at great distances. Moving the switch to OFF shuts off power to the motors and to the lights.

LIGHTING CONTROL PANEL

NOTE

On some airplanes, the indicator light test switch and the indicator light dimmer switch are on the stand-by instrument inverter switch panel.

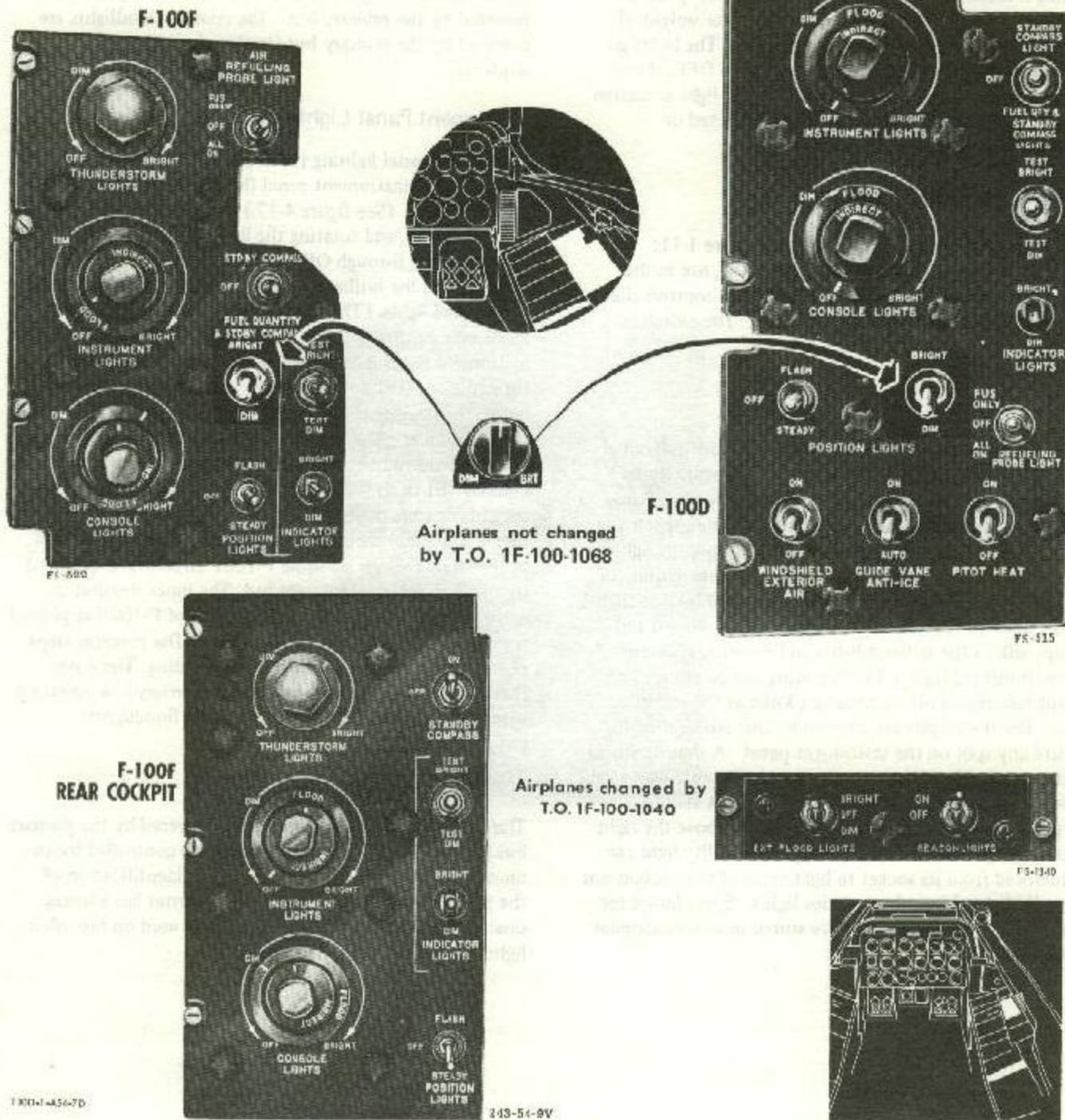


Figure 4-17

Landing-Taxi Light Switch.

The retractable landing-taxi lights are controlled by a two-position, secondary-bus-powered switch. (See figure 1-35.) 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.

Exterior Floodlight Switch.

Moving this switch (22, figure 1-10; 11, figure 1-11; 21, figure 1-15; 21, figure 1-16; figure 4-17), not in the rear cockpit, from OFF to BRIGHT or DIM controls the brilliancy of the floodlights in the wings. The switch is powered by the secondary bus.

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 left console.

Console Light Rheostats.

The lighting and brilliancy of the console indirect lights and floodlights are controlled by dual rheostats. (See figure 4-17.) 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 4-17.) These rheostats rotate independently, and rotating the inner knob marked "INDIRECT" through OFF, DIM, and BRIGHT turns on and controls the brilliancy 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 4-17.) 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 (FULL QUANTITY & STBY 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. Adjustment of the console light rheostat controls the brilliance of the lights if dc power is on 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, figures 1-10 and 1-11; 6, figures 1-15 and 1-16; 7, figure 1-18.) 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 inter-connecting 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 4-18.) The single tank on F-100D airplanes and each of the two tanks on F-100F airplanes has a capacity of about 5 liters (1.3 gallons). However, 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 1-41.) 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 1-41 for oxygen specification).

OXYGEN REGULATOR.

The pressure-breathing, diluter-demand oxygen regulator (figure 4-19) 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 4-19) 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.

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.

F-100D-1-A73-10

COCKPIT ALTITUDE—FEET	HOURS					EMERGENCY—DESCEND TO ALTITUDE NOT REQUIRING OXYGEN
	5	4	3	2	1	
35,000 AND ABOVE	31.4 (12.8)	25.2 (10.2)	18.9 (7.7)	12.6 (5.1)	6.3 (2.6)	
30,000	23.3 (12.8)	18.7 (10.2)	14.0 (7.7)	9.3 (5.1)	4.7 (2.6)	
25,000	22.0 (19.8)	17.6 (7.8)	13.2 (5.9)	8.8 (3.9)	4.4 (2.0)	
20,000	25.0 (17.6)	20.0 (16.1)	15.0 (14.6)	10.0 (12.0)	5.0 (1.5)	
15,000	30.2 (10.7)	24.2 (8.6)	18.1 (6.4)	12.1 (4.3)	6.0 (2.2)	
10,000	30.2 (8.6)	24.2 (6.9)	18.1 (5.2)	12.1 (3.4)	6.0 (1.7)	
5,000	30.2 (6.8)	24.2 (5.4)	18.1 (4.1)	12.1 (2.7)	6.0 (1.4)	
0	30.2 (5.5)	24.2 (4.4)	18.1 (3.3)	12.1 (2.2)	6.0 (1.1)	
						BELOW 1

Figure 4-18

Emergency Lever.

The emergency lever (figure 4-19) 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 4-19) is safety-wired to the ON position. It also has an OFF position.

Pressure Gage and Flow Indicator.

The pressure gage (figure 4-19) shows oxygen pressure available to the regulator. The flow indicator (oflinker) consists of an oblong opening which shows black and white alternately during the breathing cycle.

Liquid Oxygen Quantity Gage.

The liquid oxygen quantity gage (4, figures 1-10, 1-11, and 1-15; 5, figure 1-16; 3, figure 1-18) 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.

MD-1 OXYGEN REGULATOR

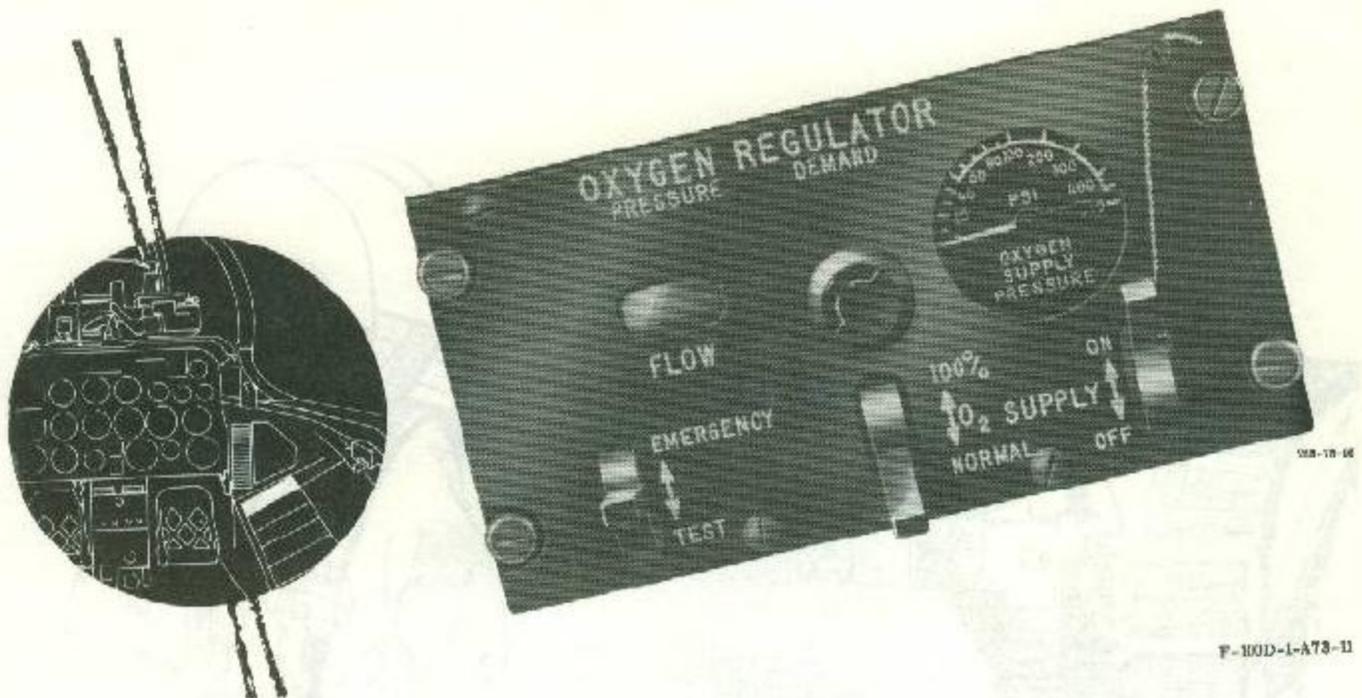


Figure 4-19

EMERGENCY OPERATION OF OXYGEN SYSTEM.

Refer to Oxygen System in section III.

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 4-21.

GROUND REFUELING.

Single-point Refueling.

The internal fuel tanks are normally filled through the single-point refueling system. The single-point refueling

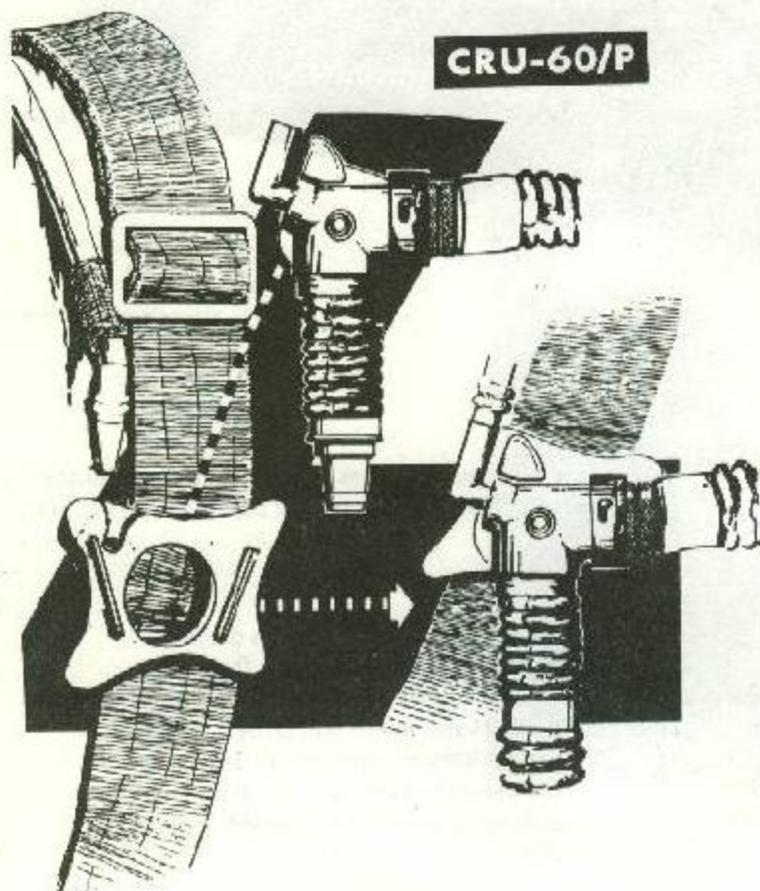
receptacle is behind an access door on the left side of the fuselage, just below the flap trailing edge. (See figure 1-41.)

NOTE

Loss of the access door from the single-point refueling receptacle in flight, or a malfunction of the drop tank fuel transfer control 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. On F-100F-20 airplanes, single-point refueling of the 450- or 335-gallon drop tanks may be performed without

OXYGEN HOSE HOOKUP



WARNING

Do not attach stowage strap on seat oxygen hose to the connector because this may prevent pilot-seat separation during ejection sequence.



- 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. Place oxygen mask hose beneath right shoulder harness strap.
- 3** Couple seat oxygen hose to lower part of connector.
- 4** Attach bail-out bottle hose to swiveling part of connector by inserting male coupling of bail-out bottle hose and turning it clockwise against spring-loaded collar.

Figure 4-20

SINGLE-POINT AND AIR

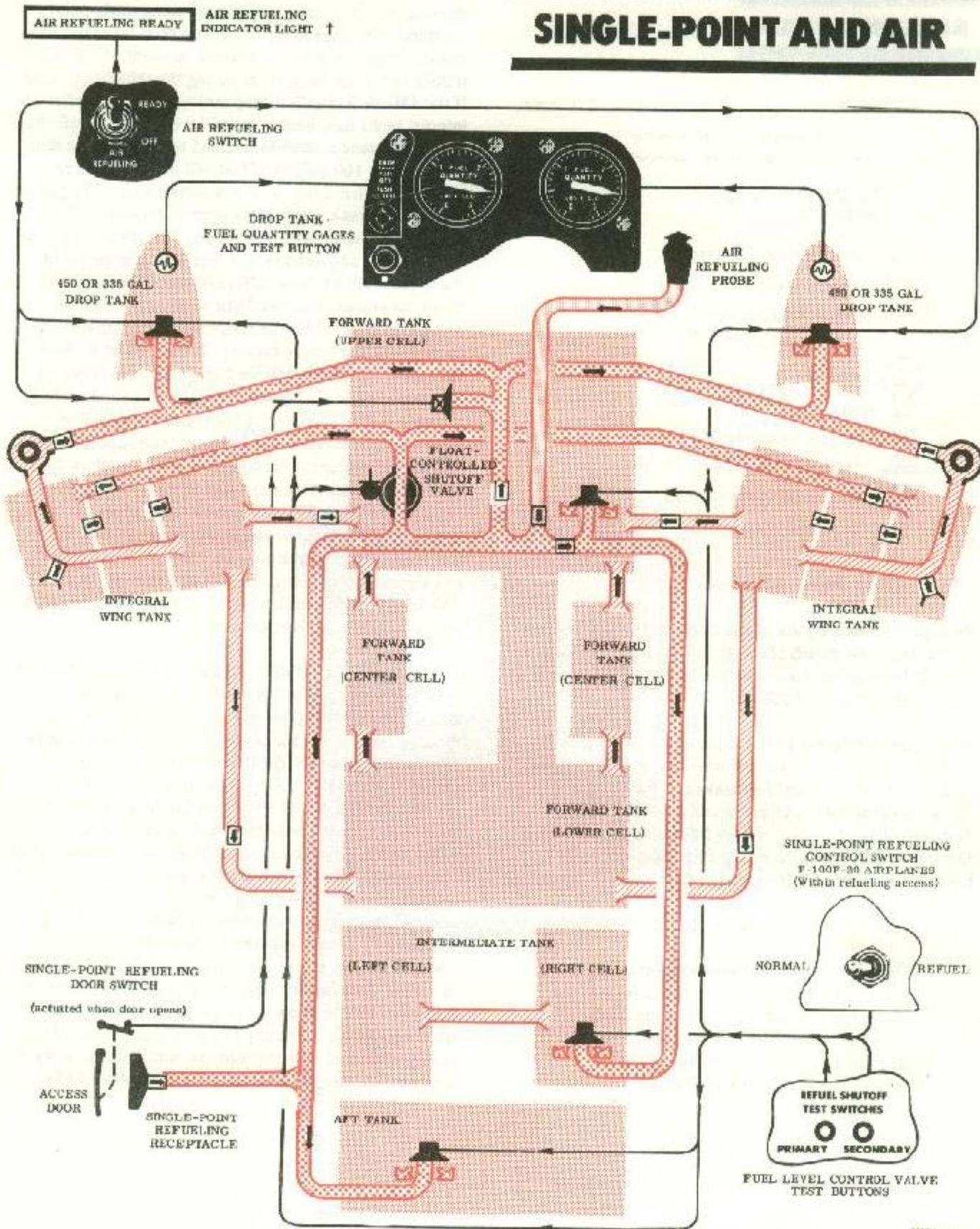


Figure 4-21 (Sheet 1 of 2)

100F-148-31

REFUELING SYSTEM

NOTE

Refer to "Airplane Fuel System" in Section I.

- Light shows illuminated for information only.

† All airplanes except F-100D;
S/N 55-3511, and F-100F;
S/N 56-3972.

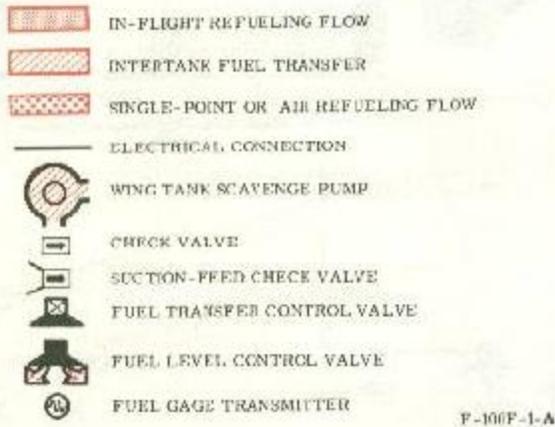


Figure 4-21 (Sheet 2 of 2)

the engine running by use of the single-point refueling control switch. This switch allows the 450- or 335-gallon drop tanks to be refueled directly before the internal tanks are filled, eliminating any backwash of the fuel.

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. 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 is 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 flight with empty 450- or 335-gallon drop tanks, the tanks should be installed on the airplane just before takeoff. 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 is started. (The transfer rate of fuel from the drop tanks to the fuselage 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 flow could allow refueling pressure to rupture fuel tanks and damage the airplane structure.

FUEL LEVEL CONTROL VALVE TEST BUTTONS. Two push buttons (figure 4-21), 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 fill 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, plunger-type switch, in an access just aft of the single-point refueling receptacle (figure 1-41), controls the sequence of tank refueling. When the access door is opened, the switch is automatically actuated and tertiary bus power (battery bus power if tertiary 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 shut-off valve will stop the fuel flow to the wing tanks when the forward tank is full. The switch is repositioned when the access door is closed, 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.

SINGLE-POINT REFUELING CONTROL SWITCH — F-100F-20 AIRPLANES. The single-point refueling control switch, in an access just forward of the single-point refueling receptacle (figure 1-41), controls the fuel level control valves of all the internal fuel tanks. The switch is powered by the tertiary bus, or battery bus if tertiary bus power is not available. When positioned outboard (refuel), the switch closes the fuel level control valves in all of the tanks (except the 450- or 335-gallon drop tanks) and the transfer valve. With all of the internal tanks shut off in

this manner, the fuel will go directly to the drop tanks. A placard by the switch specifies the amount of fuel to be pumped into the drop tanks before the switch is repositioned to inboard (normal), which will allow all of the internal tanks to fill normally, by opening the fuel level control valves. An umbrella-shaped guard on the access door positions the switch to inboard when the door closes, ensuring that fuel can be transferred during an air refueling hookup.

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 1-41.) 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 1-23; fuel specifications are given in figure 1-41.

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 4-22) are a detachable unit. Two lights (figure 4-22), one at the probe mast fairing and one

AIR REFUELING PROBE



Figure 4-22

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 4-21.)

Air Refueling Controls and Indicators.

NOTE

There are no air refueling controls and indicators in the rear cockpit.

AIR REFUELING SWITCH. This two-position switch (figures 1-22 and 4-21) 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 tertiary bus power (battery bus power if tertiary bus power is not available) and the level control valves in the drop tanks are de-energized, 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 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 that transferred by 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 4-17) 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 1-17 and 4-21) 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.

WARNING

When the airplane is carrying 450-gallon drop tanks changed by T.O. 6J14-2-7-507 (installation of baffles), the fuel quantity gages will not be accurate under the following conditions:

- During ground and air refueling until the tank is full. When the tank has been completely filled and the fuel is transferred by normal sequencing, the gages will read accurately from full to empty.
- After the airplane has set on the ground for a time without having the drop tanks topped off. (This is due to fuel draining by gravity from the internal cells into the tank and being trapped in the forward section by the bulkhead.)
- After maneuvers that result in a prolonged nosedown attitude.

Fuel quantity gages (1 or 30, figure 1-6; 2, figure 1-7; figure 4-21) 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 or 26, figure 1-6; 1, figure 1-7; figure 4-21) 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.

Air Refueling Operations.

For information on air refueling operations, refer to T.O. 1-1C-1-10.

"BUDDY" AIR REFUELING SYSTEM.

The airplane has provisions for a "Buddy" air refueling system.

MISCELLANEOUS EQUIPMENT.

STATUS DISPLAY LIGHTS — AIRPLANES NOT CHANGED BY T.O. 1F-100-994 OR 1F-100D-632.

Two multiple-light display units (figure 4-32), 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 4-32. 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.

STATUS DISPLAY LIGHTS – AIRPLANES CHANGED BY T.O. 1F-100-994 OR 1F-100D-632.

Placard-type lights (figure 4-32), when on, show the status of a particular system. The lights are powered by the secondary bus. Bulbs in the lights can be tested by the indicator light circuit.

VGH Data Recorder System – Airplanes Changed by T.O. 1F-100-1031.

Airplanes changed by T.O. 1F-100-1031 have a VGH (velocity, "G" forces, height) data recording system that monitors and records velocity, "G" forces, and altitude,

and other pertinent circuit information during normal flight. The system records on magnetic tape the vertical acceleration peaks experienced near the airplane CG. As these peaks are recorded, the indicated airspeed, altitude, and elapsed time of the "G" forces are also recorded. In addition, signals are recorded during gun firing, store release, in-flight refueling, and during a change in nose gear load switch position, to differentiate between ground and airborne inputs. Powered by the primary bus, the VGH data recording system consists of an A/A24U-10 recorder and a store release monitor box in the left forward fuselage, and a TRK-77/A24U accelerometer on the forward bulkhead between the main gear wheel wells. It is protected by a circuit breaker marked VGH REC/LDG GR POS CONTROL. No cockpit controls are associated with this system.

Operation of VGH Data Recording System.

The VGH data recording system receives and records for playback, vertical acceleration data from the accelerometer; airspeed and altitude data from the pitot-static system; and gun firing, store release, in-flight refueling, and nose gear load switch position data through the store release monitor box. The recorder does not run continuously, but operates only when significant flight data is accumulated, as determined by the programming in the computer recorder. Data from the airplane circuits, except nose gear load switch position and VGH information is stored until the monitor box memory circuit is reset.

Vertical velocity peaks are sensed by the accelerometer and fed to the computer-recorder. The data is received by the computer-recorder along with velocity and altitude information from the pitot-static system, converted to digital data is recorded on the magnetic tape. After flight, the recorder tape magazine is removed from the airplane for processing.

NAVIGATION COMPUTER (B-26).

Some airplanes have a B-26 navigation computer (5, figures 1-10 and 1-11) 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 not in use, the computer can be stowed under the canopy sill.

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-regulation 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, figures 1-8 and 1-9; 35, figure 1-14; 4, figure 1-17; 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 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 airflow 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 1-41) 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.

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 (34, figure 1-6; 35, figure 1-7; 1, figure 1-17) 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 1-10; 18, figure 1-11; 14, figure 1-15; 14, figure 1-16; 12, figure 1-18) is on the right console.

REAR-VIEW MIRROR.

On F-100D airplanes and in the front cockpit of F-100F airplanes, an adjustable rear-view mirror (figure 1-38) is attached to the canopy bow, at the centerline. 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.

ARMAMENT EQUIPMENT.

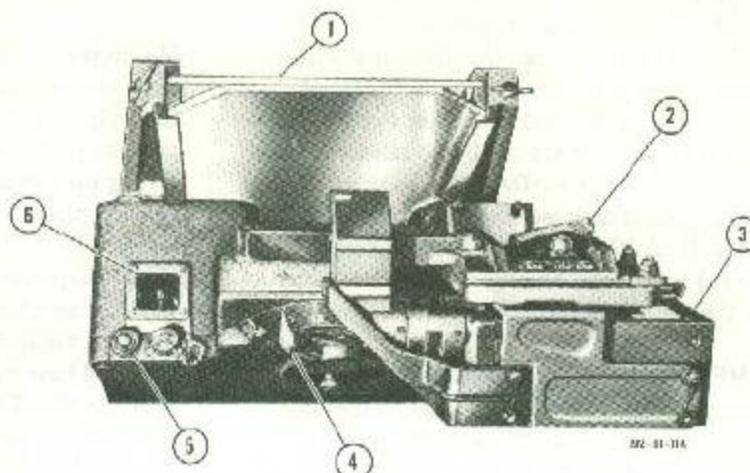
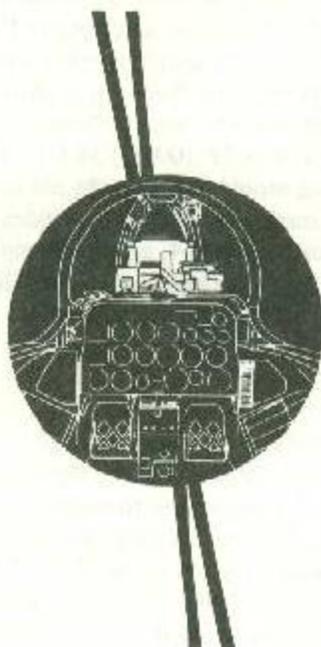
The basic armament installation consists of 20 mm guns and provisions for various external stores on jettisonable pylons fitted under each wing and fuselage centerline. On airplanes changed by T.O. 1F-100D-632, there are provisions for gun pods, and a programmer controller in the cockpit provides pulses to selected wing stations in accordance with store quantity, mode, and release interval selected. A gun-bomb-rocket sight is coupled with a radar ranging system for sighting. A gun camera on the sight records gun and missile firing. Some airplanes have a strike camera and two combat documentation cameras. Armament controls and indicators are not provided in the rear cockpit except for the following: bomb button, external load emergency jettison button, and LABS vertical gyro caging button. 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 4-23) automatically computes the required amount of lead for

*F-100F-6 Airplanes and F-100F-11 Airplanes, AF56-3770 through 3829

A-4 SIGHT



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 4-23

air-to-air gunnery as long as the pilot tracks the target smoothly. Range information is supplied by the range-only radar or by manual ranging by the pilot. The system computes lead for ranges between 900 and 9000 feet. The sight provides for automatic electrical caging (850 feet of range stiffness) when the function selector switch on the VRDU is moved to **ROCKET**. This eliminates the necessity for pressing the electrical caging button when delivering air-to-ground ordnance. If the armament selector is in the **BOMB** or **NAPALM** quadrants and the mode selector is in **MANUAL**, the sight will go out unless the bomb arming switch is in one of the three arming positions. The electrical power for the sight system is supplied by the tertiary bus and the sight reticle light is powered by the secondary bus.

Sight Ranging Radar.

The AN/ASG-17 fire control radar subsystem supplies range data to the A-4 sight and is powered by the tertiary bus and the main AC bus. The radar subsystem has a search range of 1800 to 9000 feet. An indicator light on the A-4 sight shows when the sight radar has locked on a target. Also, the sight reticle becomes brighter at the time

of lock-on. A manual range control supplements the radar sight and should be used if the radar ranging fails. The radar subsystem antenna is in the upper leading edge of the engine air intake duct fairing. 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.

NOTE

During gunnery training, a low target which has a relatively weak radar return, may be used. When the pilot's **RANGE MAX** control is set in the minimum position (3000 feet), it is possible for the radar to track a target to a low range (700 to 1200 feet) and then lock onto the large echo (false target), or transmitted pulse, produced by the F-100 aircraft. To overcome this condition, which occurs only during the above circumstances, the **RADAR REJECT** button should be depressed. This will allow the system to return to normal (search) operation.

A-4 Sight Controls and Indicators.

SIGHT DIMMER RHEOSTAT. The sight dimmer rheostat (figures 4-26 and 4-27) 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. When the bomb release mode selector switch is at SIGHT & RADAR, the sight reticle on the sight reflector glass is dimmed (independent of the reticle dim control). At the time of lock-on, the sight reticle increases in brilliancy. The sight dimmer rheostat is powered by the secondary bus and the tertiary bus.

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 (figures 4-26 and 4-27), which is normally at PRIMARY. It should be moved to SECONDARY if the primary filament fails. The switch is powered by the secondary bus and the tertiary bus.

SIGHT SELECTOR UNIT. The sight selector unit (figures 4-26 and 4-27) 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. With the sight function selector lever at BOMB, the sight is depressed at a preset angle. With the sight function selector lever at ROCKET, the rocket depression angle selector lever can be moved to the required mil setting for rocket firing and bomb delivery. Moving the lever to ROCKET electrically cages the sight. The sight function selector 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 and bombing conditions can be obtained from tables in the Aircrew Nonnuclear Weapon Delivery Manual, T.O. 1F-100C(I)-34-1-1. The desired depression setting should be set on the mil scale with the variable index markers provided. The index markers, numbered from 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 4-23) 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.

NOTE

On airplanes changed by T.O. 1F-100-994, a remote wingspan lever is mounted above the RHAW system controls and indicators. The right edge of the remote wingspan lever is used as the aligning index.

MANUAL RANGING CONTROL. The twist control in the throttle grip (figure 1-21) 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 uses secondary and tertiary bus power.

RADAR REJECT BUTTON. The radar reject button (figure 1-33), 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 (figures 4-26 and 4-27), 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 1-21) stabilizes the sight gyro reticle image by caging the sight gyros. The sight electrical caging button 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. This lever (figure 4-23) is for mechanically caging the sight. The lever can be used during deliveries if desired or in case the sight fails. The lever should be at UNCAGE for normal automatic operation of the sight. It must be at 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, takeoff, and landing, to prevent damage to the sight mechanism.

SIGHT RANGE DIAL. Target range is indicated by the sight range dial (figure 4-23). Graduated in feet from 600 to 6000, the dial presents range distances as determined by the manual range control or the radar ranging system. Secondary and tertiary bus power is required for operation.

RADAR LOCK-ON LIGHT. The radar lock-on light (figure 4-23) 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.

CAMERA SYSTEMS.

Combat Documentation Camera — F-100D Airplanes Changed by T.O. 1F-100D-627.

Forward and aft photographic documentation of weapon impacts is provided by two motion-picture cameras installed in a nonjettisonable pod (figure 4-24) on the underside of the left wing, approximately midway between the fuselage and inboard wing station. The forward camera is a Type N-9, identical to the Type N-9 that is mounted on the sight, except that the pod camera has a 20 to 80 mm variable focal length lens and a larger film magazine. The forward camera is mounted on an adjustable base that permits various elevation adjustments from zero (straight forward) to 20 degrees down. The aft camera is a Type DEM-4C that is an electrically driven, 16 mm internally loaded reel type camera. It has a 17 to 68 mm variable focal-length lens. The aft camera mount is adjustable to permit variations in elevation from zero (straight aft) to 25 degrees down and from 45 to 60 degrees down. Camera operation is completely automatic and is initiated by pressing the trigger to the first and/or second detent, or pressing the bomb button. There are no other wing camera pod system cockpit controls. Adjustment for elevation, light conditions, frame speed, lens aperture, and camera overrun time are preset in the pod before flight.

In addition to the cameras, the pod contains a heater and a blower that supply a continuous flow of warm (80°F to 105°F) air across the camera windows to prevent condensation and frost. Sensors in the system help maintain temperatures within these limits and prevent overheating in case of a blower malfunction. A single window in the pod fairing for the forward-facing camera is equipped with electrically actuated shutters to protect the window from debris that might be thrown during takeoff. The window shutters open when camera operation commences and remain open.

CAMERA INSTALLATIONS

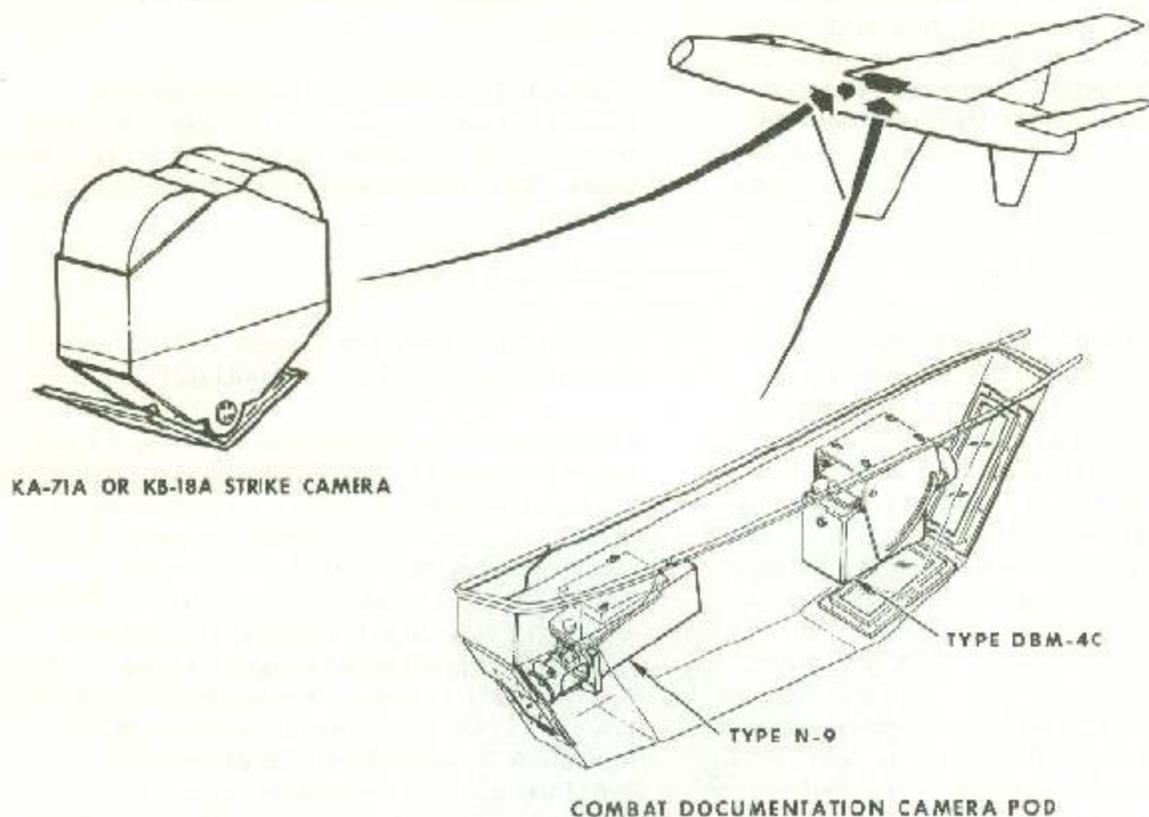


Figure 4-24

They can be closed manually during ground servicing of the pod. Two permanently exposed windows are provided in the pod aft fairing for the DBM-4C camera. The secondary bus provides power for the cameras when camera operation is started by the trigger. Tertiary bus power is used when the bomb button is pressed to start camera operation. The camera heater and blower circuits, powered by the main 3-phase ac bus, are energized when power is applied to the airplane.

Operation of Combat Documentation Cameras.

PREFLIGHT CHECK. During this check, make sure ground personnel have installed, loaded, and set the cameras

according to mission requirements, and that camera pod and doors are secured.

IN-FLIGHT OPERATION. Press trigger or bomb button. Pressing the trigger or bomb button starts forward camera operation and energizes a start-delay relay for the aft camera. At the end of this preset (one to 30 seconds) delay, aft camera operation begins. Both cameras continue to function for a preset overrun time of one to 30 seconds following release of the trigger or bomb button. If only the cameras are to be used, the trigger safety switch should be at CAMERA (gun-missile switch* as SAFE), and the armament selector switch should be at OFF, so that only the cameras will be actuated by

*Airplanes changed by T.O. 1F-100D-632

either detent of the trigger or by pressing the bomb button. To use the cameras during gun- and missile-firing operations, the trigger safety switch should be at either GUNS CAMERA or MISSILES CAMERA, respectively (gun-missile switch* at either one of the four gun positions or at MISSILES, respectively). When the trigger is pressed to the first detent, camera operation begins and continues when the trigger is pressed to the second detent to fire the guns or missiles. The cameras can be operated regardless of armament selector switch position, by pressing the bomb button.

NOTE

If tactical conditions permit, maintain a wings-level attitude from the time the weapon is released to one second following weapon impact. This will help to improve assessment of weapon delivery accuracies.

Strike Camera — Airplanes Changed by T.O. 1F-100-977.

On F-100D Airplanes, either an electrically operated Type KA-71A or a Type KB-18A, 70 mm strike camera (figure 4-24) can be installed, or on F-100F airplanes, a KB-18A camera can be installed to provide a panoramic capability for high-speed, low-altitude photographic battle damage assessment. The camera has a 3-inch, f2.8 lens with an automatic exposure control and is in a fixed mount in the underside of the fuselage to the left of the nose gear wheel well (to the right of the nose gear wheel well on F-100F Airplanes). On F-100D Airplanes, the left-hand landing-taxi light is moved slightly forward in the fuselage to accommodate the camera installation. On F-100F Airplanes, the right-hand landing-taxi light is moved slightly aft for the same purpose. The landing-taxi light switch function is unchanged. The camera is positioned for presentation of surface area directly below the airplane from the forward horizon to the aft horizon. This is accomplished by a rotating prism that scans 180 degrees during the taking of each photograph. A glass window beneath the camera protects the camera prism. Condensation and frost are kept from forming on the camera window by hot air from the defrosting and anti-icing system. A sensor on the camera window glass causes a control valve to open at 80°F, allowing the hot air to flow across the inner surface of the camera window, and close at 100°F to shut off the

hot airflow. This control valve also can be opened or closed by a sensor in the camera bay. If the temperature in the bay should rise above 125°F, the sensor will cause the valve to close and shut off the flow of hot air to the camera window. Cooling air extracted from the aft electronic equipment cooling system provides a continuous flow of cooling air to the camera bay. The temperature control circuit is energized when secondary bus power is applied to the airplane.

Camera shutter speed, lens aperture, and a picture sequence of 4 cps (preset at 1, 2, or 4 cps on the KB-18A) are automatic, while camera overrun time of 0 to 10 seconds (0 to 32 seconds on the KB-18A) is preset on the camera before flight. Camera operation is completely automatic and is initiated by pressing the trigger to the first and/or second detent, or pressing the bomb button. There are no other strike camera cockpit controls. The secondary bus provides power for the camera when camera operation is started by the trigger. Tertiary bus power is used when the bomb button is pressed to start camera operation.

Operation of Strike Camera.

PREFLIGHT CHECK. During this check, make sure ground personnel have installed, loaded, and set the camera according to mission requirements.

IN-FLIGHT OPERATION. Press trigger or bomb button for camera operation. If only the camera is to be used, the trigger safety switch should be at CAMERA (gun-missile switch* at SAFE), and the armament selector switch should be at OFF, so that only the camera will be actuated by either detent of the trigger or by pressing the bomb button. To use the camera during gun- and missile-firing operations, the trigger safety switch should be at either GUNS CAMERA or MISSILES CAMERA, respectively (gun-missile switch* at either one of the four gun positions or at MISSILES, respectively). When the trigger is pressed to the first detent, camera operation begins and continues when the trigger is pressed to the second detent to fire the guns or missiles. The camera can be operated regardless of armament selector switch position, by pressing the bomb button.

Gun Camera.

The Type N-9 or KB-3† gun camera (figure 4-23) on the sight, is an electrically driven, magazine-type, 16 mm

*Airplanes changed by T.O. 1F-100D-632

†Airplanes changed by T.O. 1F-100-977, 1F-100-1001, or 1F-100D-627

motion picture camera that photographs the sight reticle and target simultaneously. The camera can be adjusted for various light conditions from the cockpit; however, frame speed, lens aperture, and camera overrun time (0 to 30 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, when the bomb button is pressed†, 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.

Camera Controls.

CAMERA SHUTTER SELECTOR SWITCH. The shutter setting of the camera is adjusted through a tertiary-bus-powered rotary selector switch (4, figures 1-8 and 1-9; 32, figure 1-14). 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 (30, figure 1-8; 31, figure 1-9; 31, figure 1-14), 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 (from 4 to 30 seconds) from trigger release to start of the second time interval. The second time interval represents camera running time (from 2 to 30 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 (6 to 63 seconds) including the preset overrun time of 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 (gun-missile switch* at one of the four gun positions). 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 or dive bombing, the trigger safety switch should be at CAMERA. During rocket firing and manual bomb release, 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 (gun-missile switch* at SAFE) so that only the gun camera will be actuated by either detent of the trigger. Upon release of the trigger, the gun camera continues to operate only for the preset overrun time.

If gun camera operation is desired during missile firing, the trigger safety switch should be at MISSILES CAMERA (gun-missile switch* at MISSILES) 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.

WARNING

The missile master switch should be correctly positioned to prevent unintentional firing of missiles when only gun camera operation is desired.

Auxiliary Camera (F-100F Only).

The auxiliary camera receptacle (8, figure 1-18), in the rear cockpit only, provides a power source (tertiary bus) for operation of a hand-held camera.

*Airplanes changed by T.O. 1F-100D-632

†Airplanes changed by T.O. 1F-100-977, 1F-100-1001, or 1F-100D-627

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.

For certain restrictions on use of the 20 mm guns, refer to Gun-firing Limitations in section V.

Gunnery System Controls — Airplanes Not Changed by T.O. 1F-100D-632.

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 and gun bay purging when the trigger is pressed to the first detent. At the second trigger detent, gun camera operation and gun bay purging continues, and power is provided to actuate the guns. With the switch at MISSILES CAMERA, power is supplied to the gun camera at the first trigger detent. Gun camera operation continues when the trigger is pressed to the second detent to fire the missile. Power to the guns and missiles is disconnected when the switch is at CAMERA. However,

power is continuously supplied to the gun camera which may then be operated by pressing the trigger to the first or second detent.

NOTE

The gun-firing circuit is inoperative when the weight of the airplane is on the nose gear.

GUN SELECTOR SWITCH. The gun selector switch, on the upper left corner of the instrument panel, permits firing either the two upper guns in pairs, the two lower guns in pairs, or the four guns simultaneously. With the switch at UPPER, the fire control circuit for the lower guns is opened, preventing operation of these guns. With the switch at LOWER, the fire control circuit for the upper guns is opened, preventing operation of these guns. Turning the switch to ALL completes the fire control circuit to all guns. The gun selector switch is powered by the secondary bus.

TRIGGER. The gun-firing, missile, and gun camera circuits are energized by the trigger (figure 1-32) 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 and gun bay purging 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.

Gunnery System Controls — Airplanes Changed by T.O. 1F-100D-632.

GUN-MISSILE SWITCH. Electrical power for operation of the missiles and guns is controlled by secondary bus power through the gun-missile switch. (See 8, figure 1-6.) The switch can be used for selecting the missile system, to permit the option of firing the two upper 20 mm guns in pairs, the two lower 20 mm guns in pairs, all 20 mm guns simultaneously. Turning the switch to **MISSILES** provides power for the missile system and the adjustable camera timer. Turning the switch to **UPPER** opens a fire control circuit to prevent operation of the lower guns. Turning the switch to **LWR** opens a fire control circuit to prevent operation of the upper guns. With the switch at **ALL**, the fire control circuit is completed to all fuselage-mounted guns. Power to the gun-firing and missile circuits is disconnected with the gun-missile switch at **SAFE**. However, power is available to all cameras with the switch at any position.

NOTE

The gun- and missile-firing circuits are inoperative when the weight of the airplane is on the nose gear.

TRIGGER. The gun-firing, missile, and camera circuits are energized by the trigger (figure 1-32), which has two detent positions and is powered by the secondary bus. With the gun-missile switch at **UPPER**, **LWR**, or **ALL**, the first detent of the trigger energizes the cameras and the 20 mm gun purge door selector valve so that utility hydraulic pressure can open the purge door for gun bay purging. At the second trigger detent, camera operation and gun bay purging 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. With the gun-missile switch at **POD**, and either or both inboard station selector switches

at **NORM**, the first detent of the trigger energizes the cameras, and the second trigger detent fires the 7.62 mm gun(s). When more than one SUU-11A/A pod is carried on a TER, all guns fire simultaneously from the station selected. With the gun-missile switch at **SAFE**, only the cameras will be actuated by either detent of the trigger. Missiles are fired with the trigger pressed to the second detent when the gun-missile switch is at **MISSILES**, and the additional required switches are properly positioned. Refer to AIM-9B/E Missile System in this section for additional missile-firing information.

Gunnery System Controls — All Airplanes.

GROUND FIRE SWITCH. The ground fire switch (33, figure 1-8; 34, figure 1-9; 16, figure 1-14) allows guns to be fired on the ground, or AIM-9B/E/J 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

When the 20 mm 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. The ground fire switch should not be used in flight, because a gun gas explosion in the gun bay can result.

Firing Guns — All Airplanes.

In air-to-air combat, the guns are normally fired by using the A-4 sight with radar ranging. The guns can be fired, using manual ranging 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. Refer to Aircrew Nonnuclear Weapon Delivery Manual, T.O. 1F-100C(I)-34-1-1, for gun-firing procedures.

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.

ORDNANCE SYSTEM.

Six stations for mounting various combinations of stores 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. Ordnance equipment includes a detachable, forced-ejection type pylon for each pylon station and the necessary manual and electrical controls. On airplanes changed by T.O. 1F-100D-632, a triple ejector rack (TER) can be carried at each inboard wing station. The stores can be armed and released singly, in pairs, or salvoed. 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 stores loaded "hi-blow" 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-eject.) When stores loaded "low-blow" are carried, a bypass valve is held open, allowing most of the ejection pressure to dump overboard so that stores loaded "low-blow" are dropped in a manner closely approximating a "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. All pylons can be jettisoned at once, or they can be selectively jettisoned. If a store "hangs up," the store and pylon will jettison together. 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.

Triple Ejector Rack — TER-15.

The TER-15 consists of a housing and three individual bomb racks for carriage of weapons on a Type I series pylon at the inboard wing stations. Each bomb rack on the TER has nose- and tail-arming solenoids, and can accommodate such weapons with 14-inch suspension lugs as bombs, fire bombs, rockets, and CBU dispensers. Electrical circuitry within the housing controls bomb rack release and firing from armament controls in the cockpit. A stepping switch in the TER requires a minimum of 130 milliseconds between release pulses.

TER-EMPTY LIGHTS*. Two placard-type lights (figure 4-32), labeled "TER EMPTY LH" and "TER EMPTY RH," come on to indicate that all bomb racks in the respective TER are empty, if the armament selector switch is at any position other than OFF or RKTS. The lights are powered by the primary bus. Bulbs in the lights

*Airplanes changed by T.O. 1F-100D-632.

can be tested by the indicator light test circuit when the armament selector switch is at OFF or the INOP position.

Ordnance System Controls – All Airplanes.

PYLON LOADING SELECTOR SWITCHES. These multiple position switches (figures 4-25 and 4-32) 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 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.

The pylon loading switch panel has been modified by T.O. 1F-100-1069 to include a SUU-20 position. This position allows the rockets to be fired and bombs released from the SUU-20 dispenser without repositioning the pylon loading switches in flight. Also the old CHEM & SUU-7A position has been changed to "DISPENSER."

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 G-limiter settings will be within the allowable G-limits for Type II drop tanks.

- To best utilize the 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 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 SUU-21/A dispenser is carried at the left intermediate wing station, the left intermediate wing station pylon loading selector 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 MISSILE (MISSILES & SUU-11*) for consistency with other armament procedures.

WARNING

Do not change setting of pylon loading selector switches, because loads may release when switches are reset. If selector switch 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.

Operation of Tow-target System.

Refer to Aircrew Nonnuclear Weapon Delivery Manual, T.O. 1F-100C(I)-34-1-1.

BOMB-ARMING SWITCH. The bomb arming switch is a 4-position rotary switch which receives its power from the secondary bus (see figure 4-14). The switch allows power to operate electrical solenoids which mechanically arm the stores upon release. With any of the 3 arming positions selected, arming of the respective fuze(s) will begin upon store release. Stores are released unarmed if the switch is in the SAFE position. Bomb arming is effective only when the armament selector switch is at BOMBS or NAPALM, and the external load emergency jettison handle is in the normal stowed position.

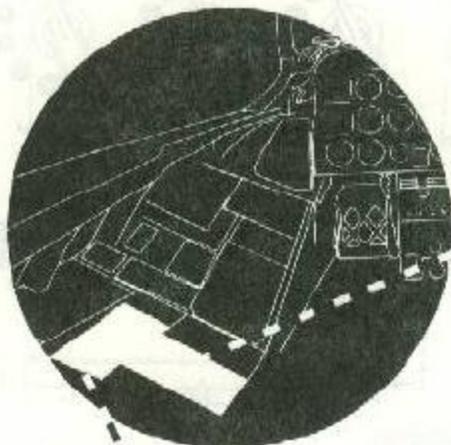
†F-100D-56 and F-100D-61 Airplanes

*Airplanes changed by T.O. 1F-100D-632

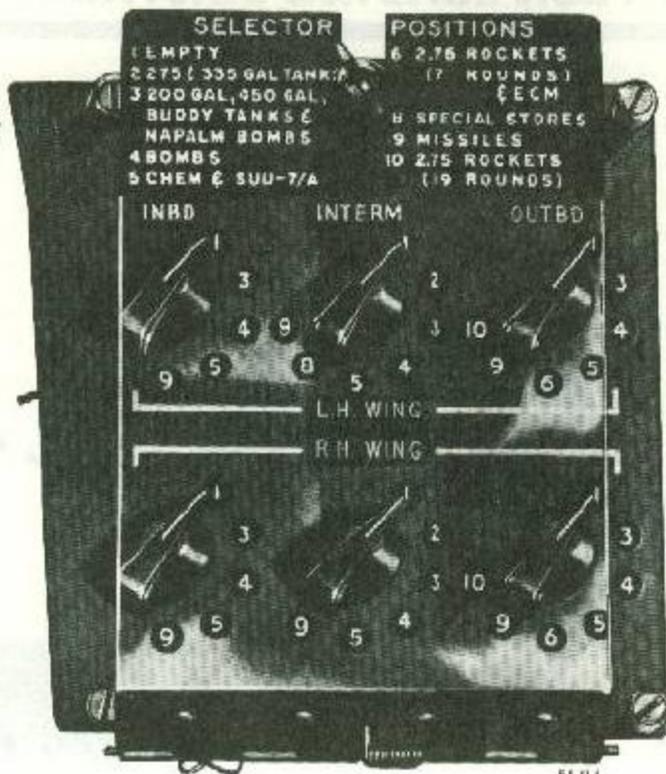
PYLON LOADING CONTROL PANEL

AIRPLANES NOT CHANGED BY T.O. 1F-100D-632

(TYPICAL)

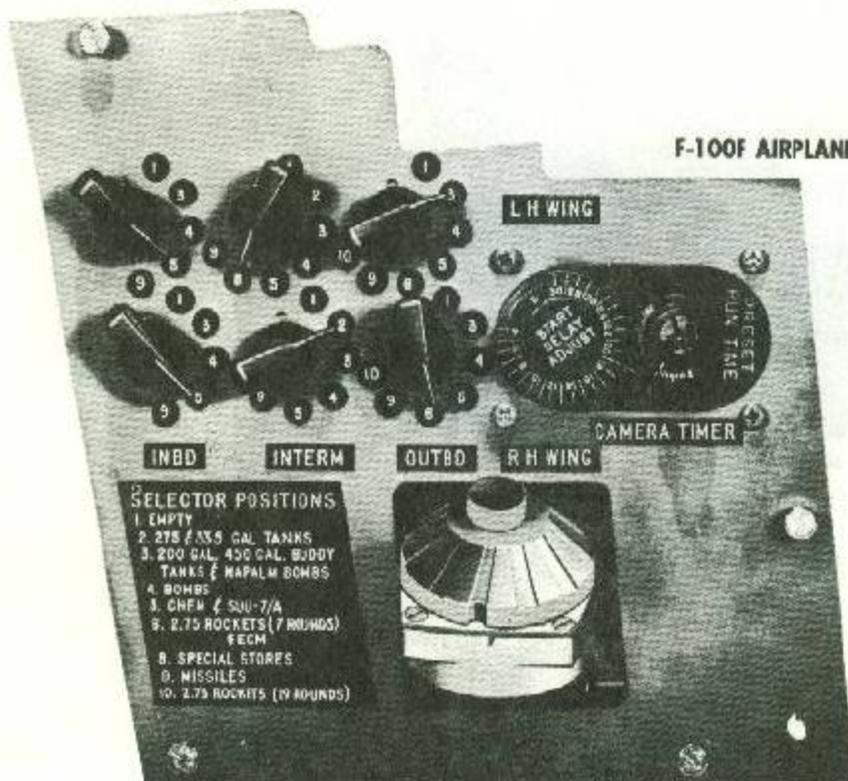


F-100D AIRPLANES



P5-914

F-100F AIRPLANES



P5-9214

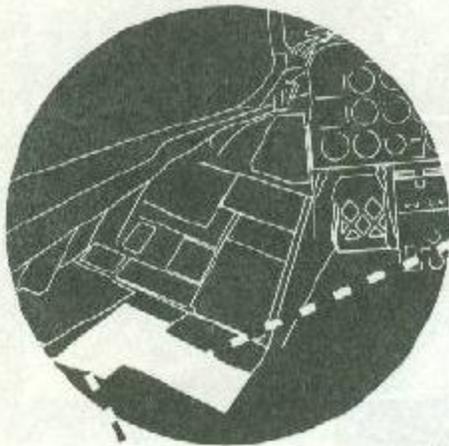
100D-1-A65-1B

Figure 4-25 (Sheet 1 of 2)

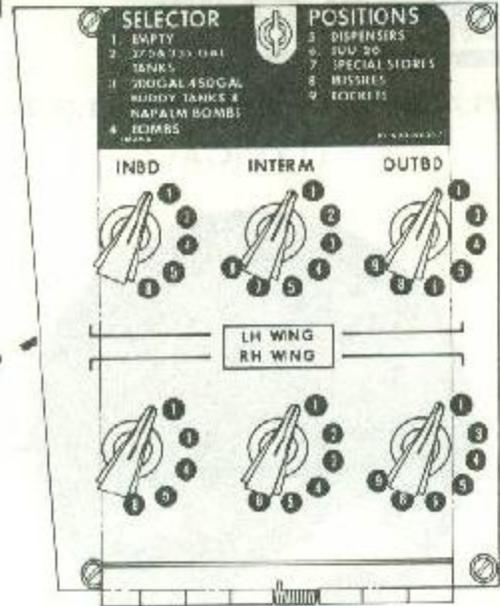
PYLON LOADING CONTROL PANEL

AIRCRAFT MODIFIED BY
T.O. 1F-100-1069

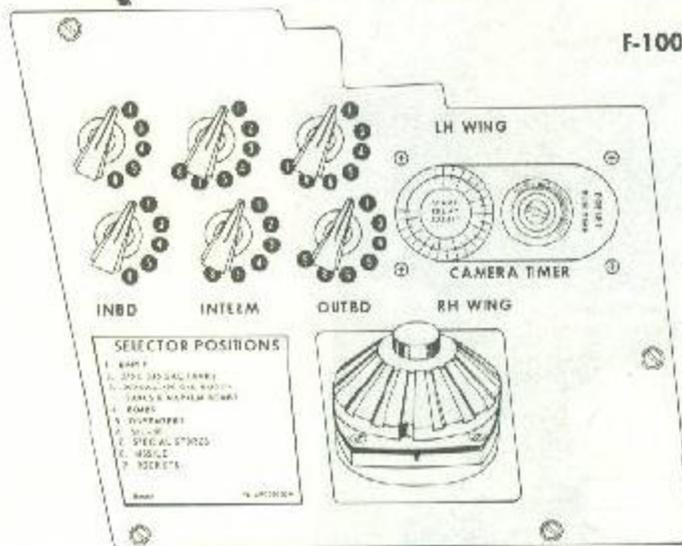
(TYPICAL)



F-100D AIRPLANES



AIRCRAFT NOT MODIFIED BY
T.O. 1F-100D-632



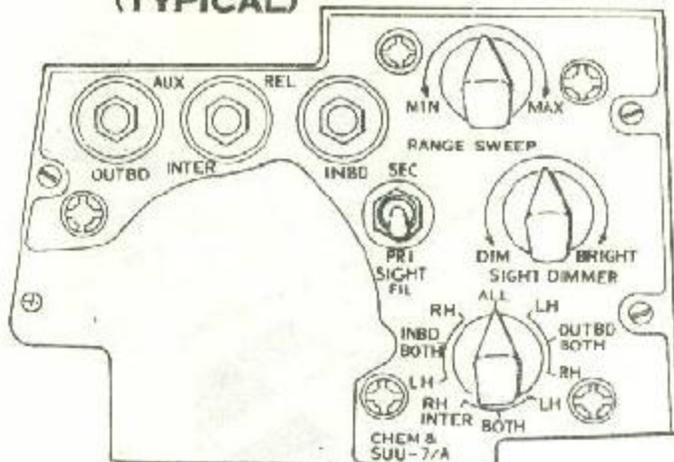
F-100F AIRPLANES

Figure 4-25 (Sheet 2 of 2)

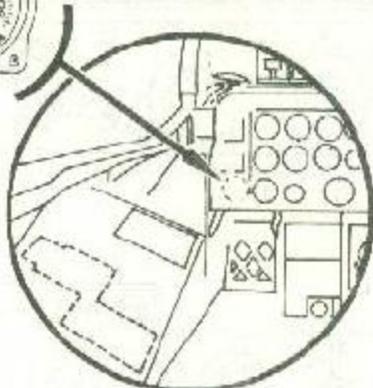
ARMAMENT CONTROL PANELS

AIRPLANES NOT CHANGED BY T.O. 1F-100D-632
 AIRPLANES CHANGED BY T.O. 1F-1069

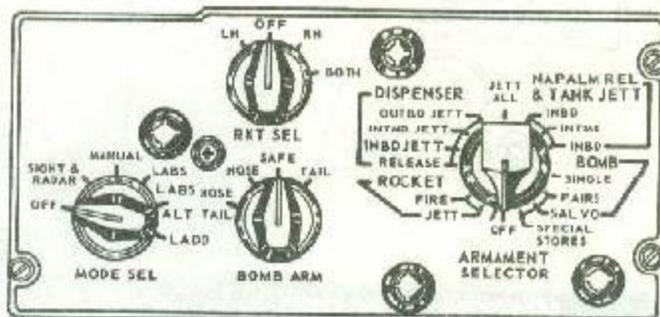
(TYPICAL)



SIGHT SELECTOR UNIT



F-100D



F-100F

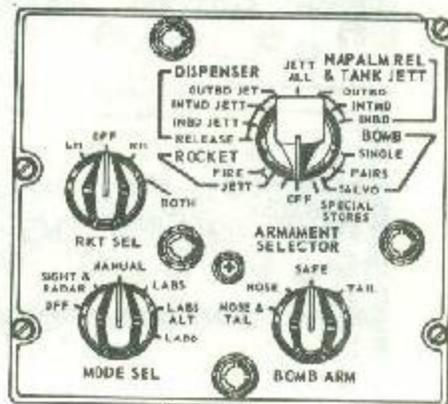
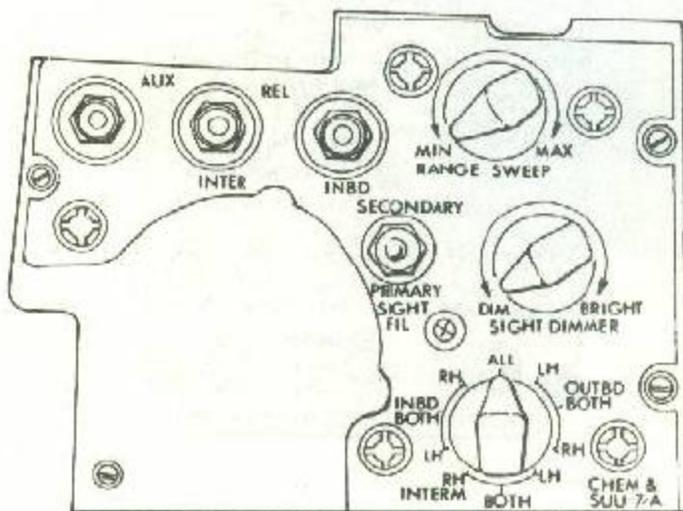
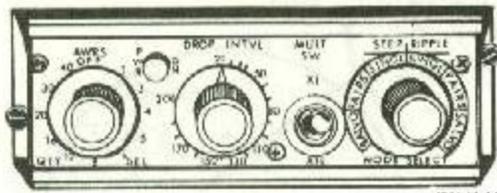


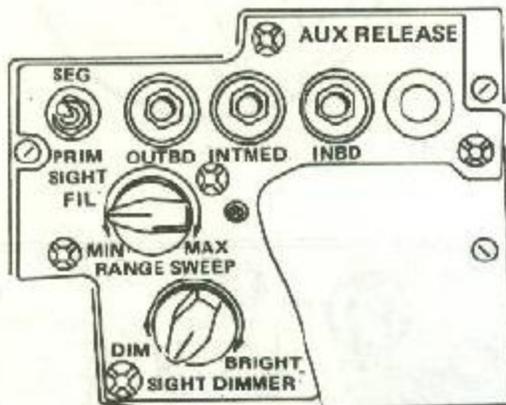
Figure 4-26

PYLON LOADING CONTROL AND ARMAMENT CONTROL PANELS

AIRPLANES CHANGED BY T.O. 1F-100D-632



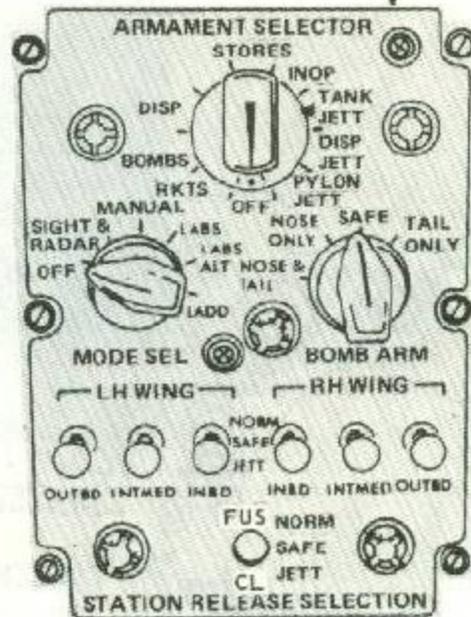
4276-1-1A



4276-51-1G



4276-51-1D



4276-51-1E

100D-1-A10-5B

Figure 4-27

BOMB BUTTON. Bomb, fire bomb, dispenser, and rocket release circuits, and tow-target, drop tank, and dispenser jettison circuits are energized (after the armament selector switch is properly positioned) by primary bus power when the bomb button (figure 1-33) 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 SUU-21/A 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 on 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 camera circuits are energized when the bomb button is pressed if the armament selector switch is at ROCKET-FIRE, or at BOMB-SINGLE, BOMB-PAIRS, or BOMB-SALVO, with the bomb release mode selector switch at MANUAL. The bomb button must be held down when bombs are being released automatically by means of automatic bombing systems.

WARNING

Before pressing the bomb button, make sure the armament selector switch, the bomb release mode selector switch, the

AWRS programmer controller,* and the station selector switches* are properly positioned for the desired release or jettison function. Failure to check switch positions 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 for selecting the mode of bomb release desired, and controlling operation of the radar ranging system and the A-4 sight. Power is applied to the sight when the bomb release mode selector switch is at MANUAL, only when the bomb-arming switch is at an arm position, and the armament selector switch is at any BOMB or NAPALM REL & TANK JETT NAPALM* position. When the switch is at SIGHT & RADAR, power is also supplied to the radar ranging system. With the bomb release mode selector switch at MANUAL, bombs are released directly by the bomb button. With the switch at LABS, the bombs are released at an automatically computed point on the bomb run. With the 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. The bomb release mode selector switch is powered by the primary bus.

EXTERNAL LOAD AUXILIARY RELEASE BUTTONS. The three external load auxiliary release buttons (figures 4-26 and 4-27) 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 ATM-9B/E/J missiles, SUU-21/A 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. (Bomb arming is effective only when the armament selector switch is at a BOMBS position, or at NAPALM REL & TANK JETT (NAPALM*.)

The pylons are not released by the auxiliary release buttons. If it is necessary to release all loads in this

†Airplanes changed by T.O. 1F-100-977, 1F-100-1001, or 1F-100D-627

*Airplanes changed by T.O. 1F-100D-632

manner, the recommended release sequence is outboard, intermediate, inboard. The airplane has provisions only for a fuselage center-line station auxiliary release button.

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 stores loaded "low-blow" since they do not require the full force of the ejector cartridge for release.

NOTE

A ground safety feature prevents release of external loads by use of the auxiliary release buttons while the weight of the airplane is on the landing gear.

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 1-35).

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.

Regardless of the position of the bomb-arming switch, all ordnance loads jettison safe. The jettison sequence (figure 4-28) is: fuselage centerline store simultaneously with intermediate wing stations in pairs; inboard wing stations in pairs; outboard wing stations in pairs. All loads are jettisoned at 1/2-second intervals between symmetrical pairs. Immediately after loads are jettisoned, all pylons jettison in the same order and in the same time delay as loads. 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.

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 (42, figure 1-6; 43, figure 1-7) mechanically releases all stores set for low blow and the 275- or 335-gallon drop tanks. Stores set for high blow cannot be mechanically released. The emergency jettison handle must be pulled quickly to its full extension of about 10 inches. Bomb-arming circuits are interrupted automatically when the emergency jettison handle is pulled, and stores 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 (39, figure 1-6; 41, 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.

ORDNANCE SYSTEM CONTROLS – AIRPLANES NOT CHANGED BY T.O. 1F-100D-632.

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 4-28. When the armament selector switch is at BOMB-SINGLE, a single bomb drops

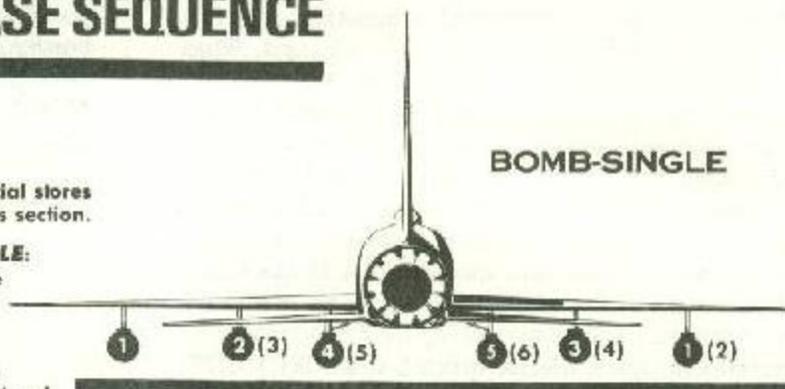
EXTERNAL LOAD RELEASE SEQUENCE

NOTE

This information does not cover release of special stores and their pylons. Refer to "Special Store" in this section.

ARMAMENT SELECTOR SWITCH AT **BOMB-SINGLE**:

Releases both outboard bombs at the same time (first the left outboard, then the right outboard on F-100D Airplanes changed by T.O. 1F-100-1032) 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 SWITCH 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.

ARMAMENT SELECTOR SWITCH AT JETT ALL (PYLON JETT*): Jettisons all loads at 1/2-second intervals between symmetrical pairs when bomb button is pressed. (Jettisons all pylons, with stores installed*).

JETTISON-ALL AND EMERGENCY JETTISON



EMERGENCY JETTISON: Emergency jettison button jettisons all loads with same time delay and sequence as JETT ALL method. Emergency jettison handle mechanically releases non-nuclear "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.

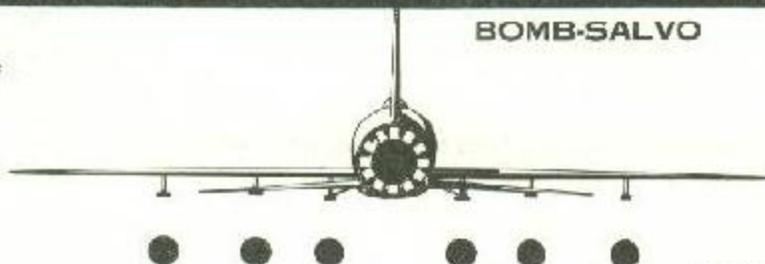
NOTE

The special store unlock handle must be actuated to ensure jettison of Type VII or VIIA pylons or Type VIII series pylons.

*airplanes changed by T.O. 1F-100D-632.

ARMAMENT SELECTOR SWITCH AT **BOMB-SALVO**:

Releases all bombs at the same time when bomb button is pressed. Pylons are retained.



BOMB-SALVO

Figure 4-28

1001-442-2C

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. Since bombs are only loaded in "low blow," there is no hazard to the wing structure in salvoing bombs. Bombs can be salvoed armed or safe, depending on the position of the bomb-arming switch. 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 is pressed. When the armament selector switch is at **DISPENSER RELEASE**, a signal is applied to the contents of a selected dispenser with each depression of the bomb button. With the switch at **DISPENSER-OUTBD JETT**, both dispensers are jettisoned when the bomb button is pressed. With the selector switch at either **NAPALM REL & TANK JETT-OUTBD**, **-INTERM**, or **-INBD**, the selected pair of drop tanks 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 airplanes 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 STORE** 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 SUU-21/A dispenser.

CAUTION

When carrying an SUU-21/A dispenser at the fuselage centerline station, and a bomb or bombs at any wing station (any pylon loading selector switch at the No. 4 position), the wing-carried bomb(s) should be released before dispensing bombs from the SUU-21/A dispenser. This is necessary to prevent one or more of the wing-carried bombs releasing simultaneously with the bomb from the SUU-21/A 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**.

ORDNANCE SYSTEM CONTROLS — AIRPLANES CHANGED BY T.O. 1F-100D-632.

STATION SELECTOR SWITCHES. Six station selector switches (figure 4-27), one for each wing station, control operation of stores and jettison of pylons selected by the armament selector switch, and firing of the 7.62 mm guns. The airplane has provisions only for a station selector switch for the fuselage centerline store. Moving a station selector switch from **SAFE** to **NORM** and pressing the bomb button or trigger operates the store(s) from the wing station or stations represented by the switch selected. The **NORM** position is also used to selectively jettison the drop tanks, CBU dispensers, and rocket launchers. When the SUU-11 pods are carried at the inboard wing stations, moving either or both inboard station selector switches to **NORM** (gun-missile switch at **POD**) and pressing the trigger to the second detent fires the selected gun. With a selector switch at **JETT** (the switch toggle must be pulled to obtain this position) and the armament selector switch at **PYLON JETT**, pressing the bomb button jettisons the pylon (stores installed go with the pylons) from the stations selected.

The position of the station selector switches does not affect the AWRS programmer controller — it affects the store release signal only. For example, if the left intermediate wing station selector switch is at SAFE and the AWRS release mode switch is at RIPPLE-PAIRS, the programmer will send a signal to both intermediate wing stations, but only the right intermediate wing station store will be operated. Missile-firing circuits are not affected by the station selector switches. The station selector switches are powered by the secondary bus.

ARMAMENT SELECTOR SWITCH. The rotary switch (figure 4-27), powered by the secondary bus, selects external ordnance for operation, or drop tanks and pylons for jettison. Moving the switch from OFF to RKTS, BOMBS, DISP, or NAPALM and pressing the bomb button fires rockets, drops bombs, dispenses CBU bomblets, and drops fire bombs from wing stations selected by the NORM position on the station selector switches. When the armament selector switch is at TANK JETT and the bomb button is pressed, the drop tanks are jettisoned from the wing stations selected by the NORM position of the station selector switches. With the armament selector switch at DISP JETT and the AWRS quantity selector switch at OFF, pressing the bomb button jettisons the CBU dispensers and rocket launchers from wing stations selected by the NORM position on the station selector switches.

WARNING

Airplanes not modified by T.O. 1F-100D-632H. When rocket launchers and/or CBU dispensers, full or partially loaded, are jettisoned in the dispenser jettison mode, the aircraft must be headed away from friendly areas. In the dispenser jettison mode, the normal rocket fire signal is received at the launcher simultaneously with the jettison signal, thus launching one or more rockets.

Pylons are retained. With the armament selector switch at PYLON JETT, pressing the bomb button jettisons pylons from wing stations selected by the JETT position on the station selector switches. (Stores installed go with the pylons.) All armament selector switch positions except

SPL STORES, TANK JETT, and PYLON JETT are wired through the AWRS programmer controller.

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 and AIM-9B/E/J Missile System in this section.

- If no electrical power is available, only stores loaded "low-blow" 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.

- On F-100F-20 airplanes, when airborne, with the landing gear handle up, AIM-9B/E/J missiles are safe-salvo-launched when the emergency jettison button is pressed. The missile pylons are then jettisoned in sequence with other 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.

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 (PYLON JETT;* station selector switches properly set), 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 (BOMBS;* station selector switches properly set) (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 (DISP JETT;* station selector switches properly set) and press bomb button.

5. To jettison only drop tanks or fire bombs, place armament selector switch at NAPALM REL & TANKS JETT-INBD, -INTERM, or -OUTBD (TANK JETT;* station selector switches properly set), and press bomb button.

6. 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.)

7. 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.

8. To mechanically drop stores loaded "low-blow" 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 AJ/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 re-engaged 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.

*Airplanes changed by T.O. 1F-100D-632

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 1-21) 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. On F-100F-20 airplanes, caging of the vertical gyro is not necessary after initial erection. The button is for fast gyro erection only, and should be used only when it is apparent that accurate vertical reference data is not being transmitted to the dive and roll indicator, such as might occur after an extreme-attitude maneuver. The sight reticle light does not go out when the button is pressed.

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 (32, figure 1-6; 37, 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 powered 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 (22, figures 1-8 and 1-9; 2, figure 1-12; 36, figure 1-13; 22, figure 1-14) 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 1-12; 23, figure 1-13) 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 1-12; 22, figure 1-13) 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 Nuclear Weapon Delivery Manual, T.O. 1F-100D-25 Series.

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).

*F-100D-21 Airplanes and F-100D-46 Airplanes AF55-2784 through -2838.

†F-100D-26 and F-200D-31 Airplanes, F-100D-46 Airplanes AF55-2839 through -2863, F-100D-51 and later Airplanes, and F-100F Airplanes

LADD System Controls and Indicators.

TIME REFERENCE POINT (TRP) TIMER. The TRP timer (32, figure 1-6; 37, 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."

LADD RELEASE TIMER. The LADD release timer (33, figure 1-6; 34, 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 1-12; 22, figure 1-13) provides certain indications during a LADD maneuver. The light is in parallel with the A-4 sight reticle light and

*F-100D-21 Airplanes and F-100D-46 Airplanes AF55-2784 through -2838.

†F-100D-26 and F-200D-31 Airplanes, F-100D-46 Airplanes AF55-2839 through -2863, F-100D-51 and later Airplanes, and F-100F Airplanes.

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.

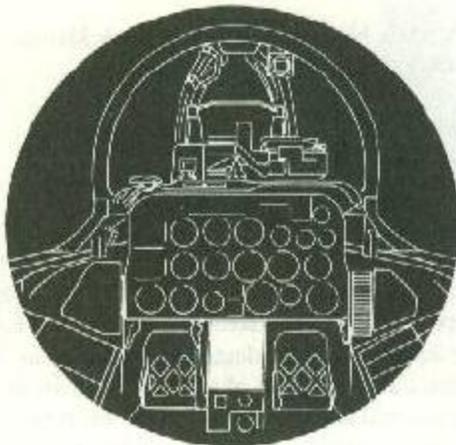
Operation of Low-altitude Droque Delivery System (LADD).

Refer to Aircrew Nuclear Weapon Delivery Manual, T.O. 1F-100D-25 Series.

SPECIAL STORES.

A special store can be carried at the left wing intermediate station and on the fuselage centerline. Either a DCU-9/A or a DCU-117/A 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 rear seat. Special store circuit breakers are shown in figures 1-27 and 1-28. Refer to Aircrew Nuclear Weapon Delivery Manual, T.O. 1F-100D-25 Series, for additional information on special store controls and indicators.

IN-FLIGHT CONTROL TESTER PANELS



DCU-9/A



DCU-117/A

Figure 4-29

F-100D-1-A13-1A

DCU-9/A Panel Controls.

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.

DCU-117/A Panel Controls.

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 disabled 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.

Special Store Unlock Handle.

To actuate the special store unlock handle (38, figure 1-6; 41, 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 SUU-21/A 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 1-22) 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.

Special Store Indicator Light.*

This light is a status display light (figure 4-34) and a placard-type indicator light (figure 1-19) in the rear cockpit. It shows "T/O" 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.

Special Store Unlocked Indicator Light.

An amber press-to-test, primary-bus-powered indicator light (38, figure 1-6; 40, 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 takeoff.

SPECIAL STORE MISSION.

For procedures to be observed when a special store mission is to be flown, refer to Aircrew Nuclear Weapon Delivery Manual, 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.

*Airplanes not changed by T.O. 1F-100D-632 or T.O. 1F-100-994

ROCKET SYSTEM.

The airplane can carry two LAU-3/A rocket launchers, each containing nineteen 2.75-inch FFAR rockets, or two LAU-32 series launchers or LAU-59/B rocket launchers, each containing seven 2.75-inch FFAR rockets. The 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 rocket firing. On some airplanes,† the cameras operate automatically when the rockets are fired. See figure 4-30 for rocket firing order.

Rocket System Controls – Airplanes not Changed by T.O. 1F-100D-632.

ROCKET SELECTOR SWITCH – Airplanes not Changed by T.O. 1F-100-1069. The rocket selector switch (figure 4-22) 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 LAU-3, -32 or -59 series launcher is rippled-fired each time the bomb button is pressed. When the bomb button is released and pressed

again, the contents of the second LAU-3, -32 or -59 series launcher is fired. This continues until all of the rockets are fired. When the armament selector switch is 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 between LAU-3/A or LAU-59/B launchers. Rockets continue firing in this manner until all are fired. Rocket firing may be interrupted by releasing the bomb button.

ROCKET SELECTOR SWITCH – Airplanes Changed by T.O. 1F-100-1069. This rocket selector switch (figure 4-26) provides a choice of rocket firing from left hand outboard station only, right hand outboard station only or both outboard stations simultaneously. With the armament selector switch at **ROCKETS-FIRE** and the rocket selector at **LH**, **RH**, or **BOTH** position, rockets will be single-fired or ripple-fired from the LAU-3 series of LAU-59 series launchers selected, when the bomb button is pressed. Single or ripple firing from each launcher is pre-set with the selector inside the launcher before takeoff.

ROCKET INTERVALOMETER RESET BUTTON – Airplanes not Changed by T.O. 1F-100-1069. 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

†Airplanes changed by T.O. 1F-100-977, -1001, or 100D-627

ROCKET—FIRING ORDER

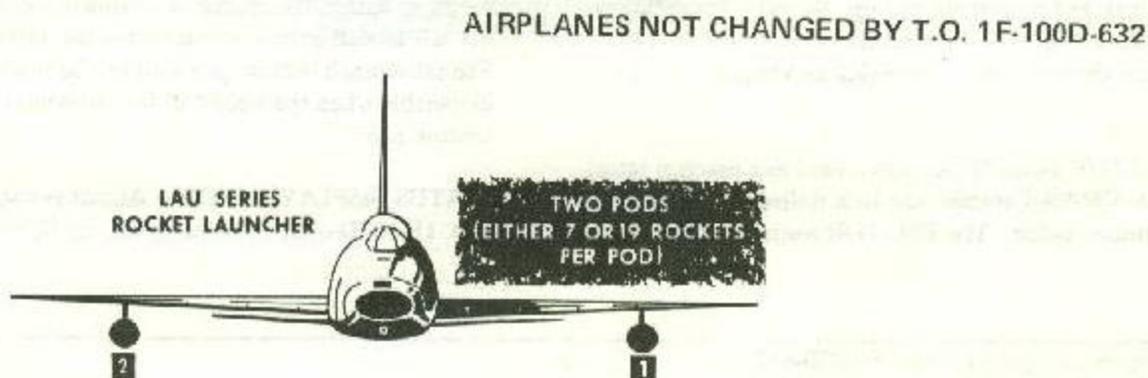


Figure 4-30

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.)

Firing Rockets.

Refer to Aircrew Nonnuclear Weapon Delivery Manual, T.O. 1F-100C(I)-34-1-1.

Rocket Emergency Jettison.

To jettison rocket launchers and adapters single or collectively, use one or more of the following procedures:

1. Turn armament selector switch to ROCKET-JETT (DISP JETT*: station selector switches properly set), and press bomb button. This jettisons only rocket launchers.

2. Press "OUTBD" external load auxiliary release button. This jettisons only the rocket launchers and adapters.

3. Pressing the emergency jettison button will jettison all stores and pylons.

4. Actuating the emergency release handle will jettison LAU rocket launchers.

Rocket launchers and adapters other than LAU series loaded "LOW BLOW" cannot be manually released.

AIM-9B/E/J MISSILE SYSTEM.

Two AIM-9B/E/J guided missiles can be carried on a special pylon at each inboard wing station (total of four missiles). 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 indicates that the missile to be launched has detected the target and is receiving an adequate homing signal.

A TDU-11/B 5-inch HVA rocket, used as a practice target for the AIM-9B/E 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. For TDU-11/B and AIM-9B/E/J firing order, see figure 4-33.

AIM-9B/E/J MISSILE SYSTEM CONTROLS AND INDICATORS.

MISSILE MASTER SWITCH. Warm-up power to the missile electronic components and gyros is provided directly, regardless of the position of the missile master switch. (See figure 4-31.) Turning the switch to RESET resets the sequence relay to missile No. 1. Turning the switch to STBY allows the missile audio signal tone to be heard in the headset. All components that receive power in the reset and standby modes are powered when the switch is at READY. In addition, the missile arming circuit is energized. The missile master switch is powered by the secondary bus.

STATION BYPASS SWITCH. The station bypass switch (figure 4-31) is powered by the secondary bus. When the switch is held at the 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 4-31) provides a volume control for the audio signal generated by the missile.

SAFE-LAUNCH BUTTON. When the ring-guarded safe-launch button (figure 4-31) 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.

STATUS DISPLAY LIGHTS — Airplanes not Changed by T.O. 1F-100D-632. Four status display lights (figure 4-32)

*Airplanes changed by T.O. 1F-100D-632

MISSILE CONTROLS

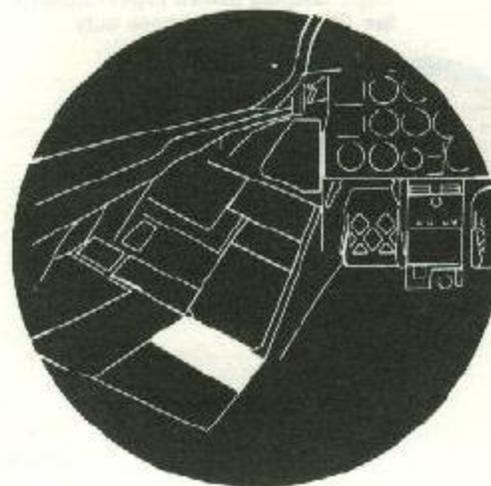
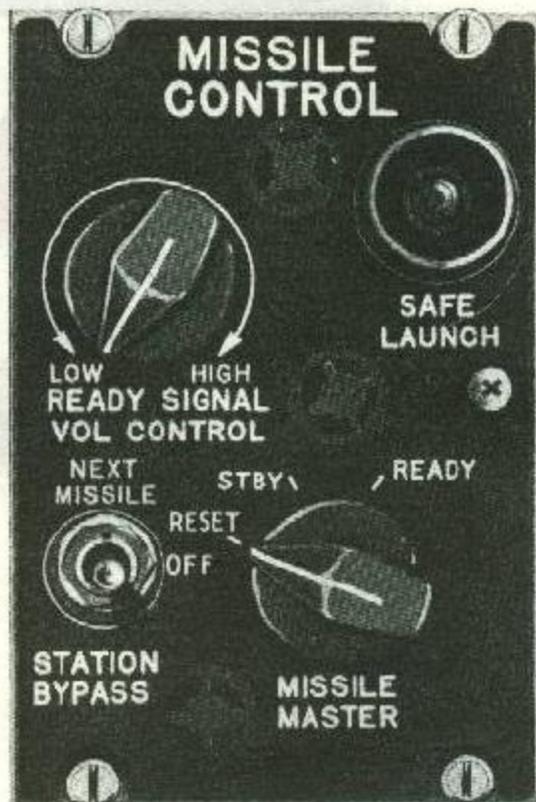


Figure 4-31

are reserved for AIM-9B/E/J missiles, 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-81" 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

MISSILE LIGHTS — Airplanes Changed by T.O. 1F-100D-632. Four placard-type lights (figure 4-32) come on to

show that a station with a missile (or target rocket) that remains unfired has been selected. When the missile master switch is properly positioned, the "MISSILE 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 firing. The light sequence/firing order is as follows:

"MISSILE 1" left inboard
 "MISSILE 2" left outboard
 "MISSILE 3" right outboard
 "MISSILE 4" right inboard

The lights are powered by the secondary bus. Bulbs in the lights can be tested by the indicator light test circuit.

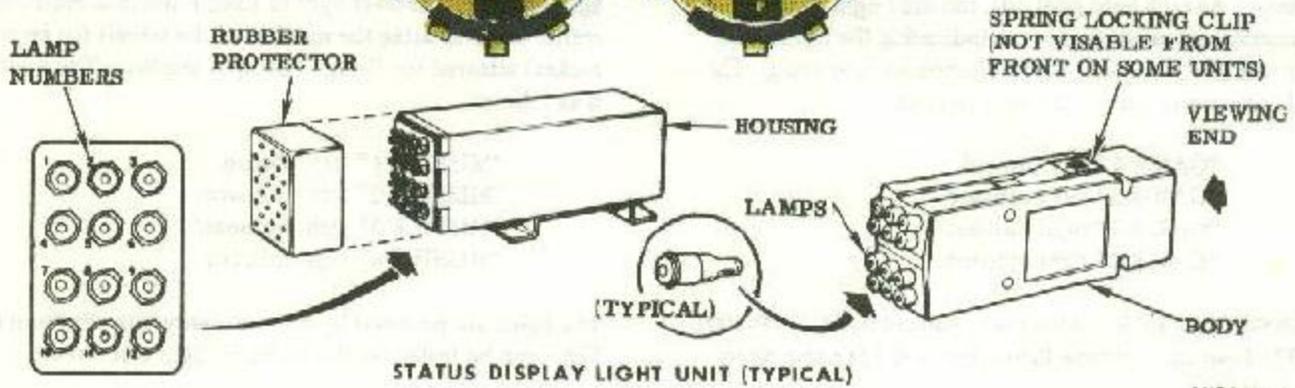
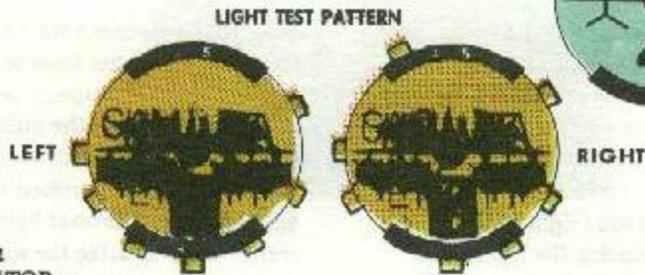
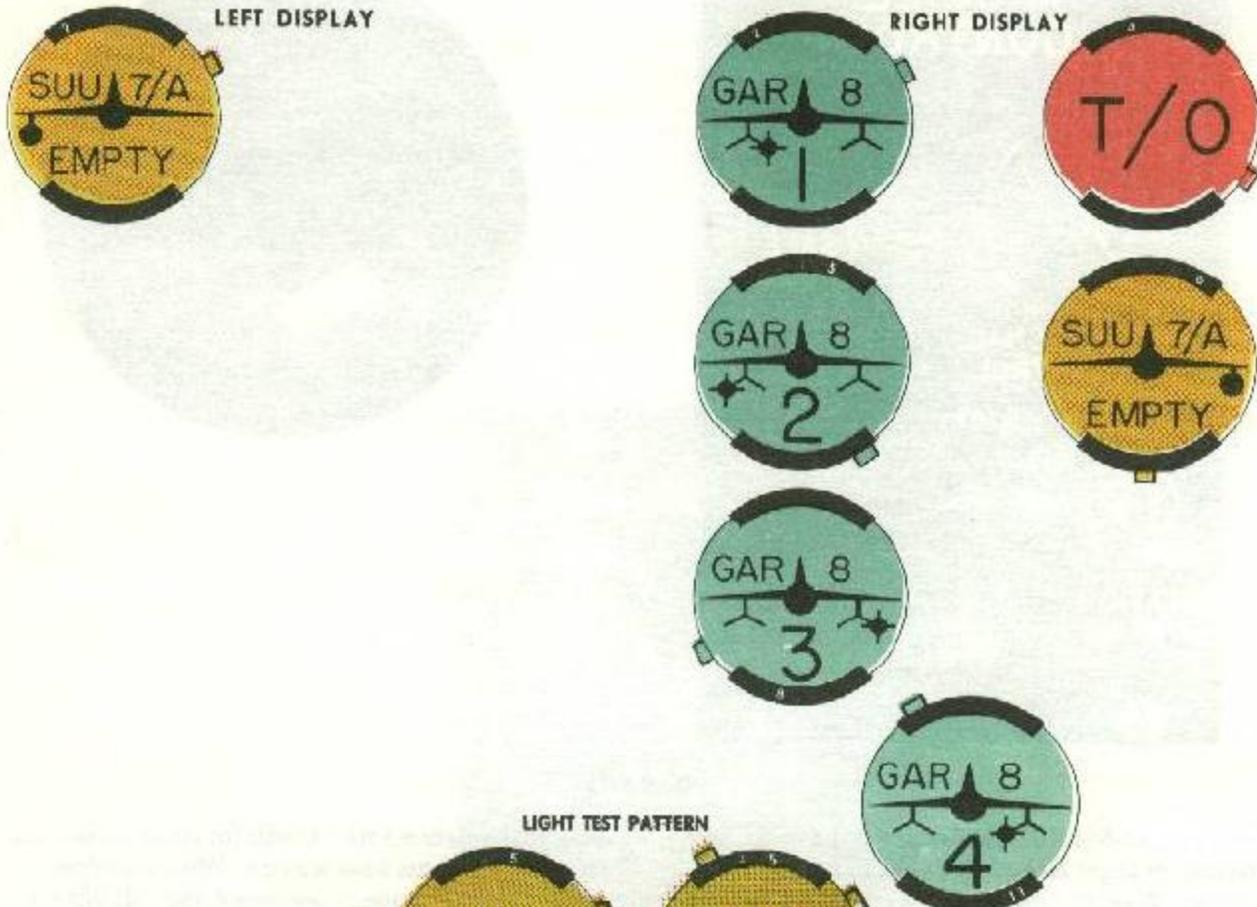
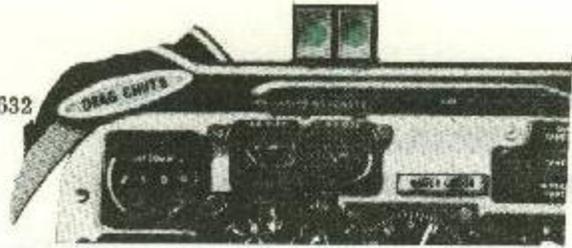
STATUS DISPLAY LIGHTS

AIRPLANES NOT CHANGED BY T.O. 1F-100-994 OR T.O. 1F-100D-632

NOTE

Lights shown on simultaneously for information only.

Light notches shown superimposed for illustrative purposes only.



STATUS DISPLAY LIGHT UNIT (TYPICAL)

100F-1A547C

Figure 4-32 (Sheet 1 of 2)

STATUS DISPLAY LIGHTS

AIRPLANES CHANGED BY T.O. 1F-100-994 OR T.O. 1F-100D-632

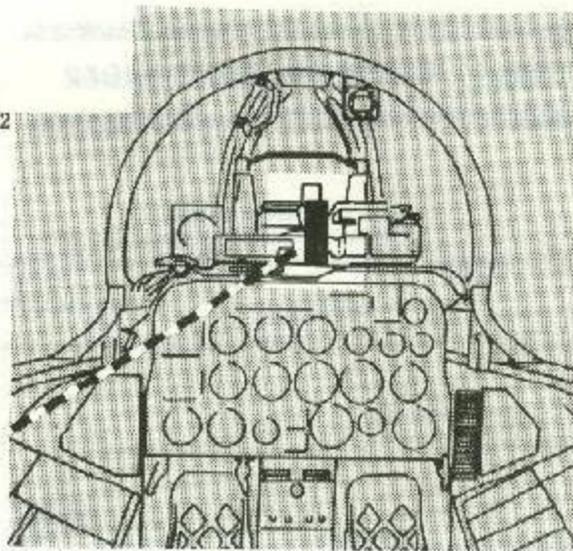
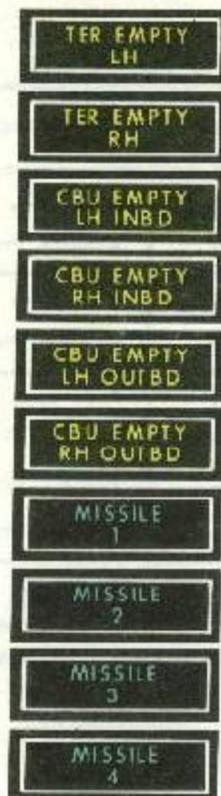


Figure 4-32 (Sheet 2 of 2)

Operation of AIM-9B/E/J Missile System.

Refer to Aircrew Nonnuclear Weapon Delivery Manual, T.O. 1F-100C(I)-34-1-1.

Missile Malfunction.

A possible cause for missile malfunction is that the gas generator requires 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 IXA pylon.

AIM-9B/E/J 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. On F-100F-20 airplanes, the safe-launch button is inoperable when the weight of the airplane is on the landing gear, or when the landing gear handle is down.

MISSILE EMERGENCY LAUNCH DURING FLIGHT. To launch missiles (and target rockets) in an emergency during flight, press missile safe-launch button.

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  TDU		① ②	Press once Release, Press again	Fire TDU Fire missile
	AIM-9B  TDU	③ ④	Press once Release, Press again	Fire TDU Fire missile
AIM-9B  TDU	AIM-9B  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 	 AIM-9B	② ③	Press once Release, Press again	Fire TDU Fire missile

NOTE

Circled numbers show missile lights that correspond to launcher stations.

Figure 4-33

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. On F-100F-20 airplanes, the missiles are safe-launched in salvo before the missile pylons are jettisoned in sequence with other pylons.

2. Turn armament selector switch to JETT ALL (PYLON JETT;* inboard station selector switch(es) to JETT), 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

*Airplanes changed by T.O. 1F-100D-632

without missiles attached when the weight of the airplane is on the landing gear, press external load emergency jettison button.

CBU DISPENSER SYSTEM — AIRPLANES NOT CHANGED BY T.O. 1F-100D-632.

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.

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.

NOTE

If no electrical power is available, CBU dispensers cannot be jettisoned by any method.

STATUS DISPLAY LIGHTS. Two status display lights (4, figure 1-6; 6, figure 1-7; figure 4-32) 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 the intervalometer of the selected dispenser has cycled and the contents of that dispenser should have been released. The lights will go out only if the armament selector switch is moved to any position other than CHEM & SUU-7/A-RELEASE.

Operation of CBU Dispenser System.

Refer to Aircrew Nonnuclear Weapon Delivery Manual, T.O. 1F-100C(I)-34-1-1.

CBU DISPENSER SYSTEM — AIRPLANES CHANGED BY T.O. 1F-100D-632.

Several types of CBU dispensers can be carried, one at each outboard wing station on a Type III series pylon, and up to three on a TER at each inboard wing station. Selective release of dispenser contents can be performed manually, or automatically at various intervals, quantities, and modes through the aircraft weapon release system programmer controller. The bomb button is used for releasing the contents of the dispensers, and all cameras operate when the contents of the selected dispenser are released.

CBU-EMPTY LIGHTS. Four placard-type lights (figure 4-32) are for indicating a CBU-empty condition. The lights come on to indicate that the intervalometer of the selected dispenser has cycled and its contents should have been released. The lights will go out only if the armament selector switch is moved to any position other than DISP. The lights are powered by the primary bus. Bulbs in the lights can be tested by the indicator light test circuit when the armament selector switch is at OFF or the INOP position.

Operation of CBU Dispensers.

Refer to Aircrew Nonnuclear Weapon Delivery Manual, T.O. 1F-100C(I)-34-1-1.

CHEMICAL TANK SYSTEM.

The airplane has provisions for carrying a chemical tank on any wing pylon station. At present, however, the airplane is not certified to carry chemical tanks.

TOW-TARGET SYSTEM.

A Type A/A37U-15 tow-target system can be installed to permit carrying, launching, and towing IDU-10/B dart target for high-speed gunnery practice.

The A/A37U-15 system components, carried at the left wing outboard station on a Type III series pylon, include a launcher, a pod containing a tow-reel assembly, and a tow-target. The reel is wound with a towline of steel cable and nylon rope, to which the target is attached. The tow cable is routed through two cutters, either cutter

actuated by a squib fired by an electrical signal, to sever the cable and release the target. Initially, the first (primary) cutter severs the cable, but in case of a malfunction, the secondary or backup cutter can be actuated. Recovery of the target and tow cable is made possible by means of a 14-foot parachute stowed in a canister at the aft end of the tow-reel pod. A duct in the forward section of the pod provides cooling air for the tow reel. Doors in the bottom of the pod permit access to the reel for inspection and maintenance. Rocket-firing circuitry and the bomb button are utilized for launching and releasing (primary cutter) the dart target. The auxiliary release for the target (backup cutter) is provided through the use of the chemical tank and CBU dispenser (CHEM & SUU-7/A) system circuitry. The system uses primary and secondary bus power. Flight patterns for tow-targets are designated by local directives. For towing limitations, refer to Tow-target Limitations in section V.

To calculate the takeoff distance when the A/A37U-15 tow-target system is carried, first compute the takeoff speed from the listed gross weight from the charts in T.O. 1F-100A-1-1, add 10 knots to the computed nose rotation and takeoff speed, then recompute the takeoff distance. At start of takeoff roll, maintain nose wheel steering to 150 KIAS.

CAUTION

Overrotation during takeoff will result in damage to the dart target and could be hazardous to the aircraft.

A/A37U-15 Tow-target System Controls.

ARMAMENT SELECTOR SWITCH. Turning the armament selector switch (figure 4-26) to **ROCKET FIRE** (rocket selector switch at **SINGLES***) and pressing the bomb button launches the tow target. After target launch, the **ROCKET FIRE** position is also used to actuate the primary cable-cutter squib when the bomb button is pressed. When the armament selector switch is turned to **CHEM & SUU-7/A-RELEASE** (**DISPENSERS-RELEASE** on aircraft changed by T.O. 1F-100-1069), and the bomb button is pressed, power is supplied to actuate the backup cable-cutter squib.

ROCKET SELECTOR SWITCH. When the rocket selector switch (figure 4-26) is moved to **SINGLES** (armament selector switch at **ROCKET-FIRE**), circuitry is completed to permit target launching and actuation of the primary cable-cutter squib.

ROCKET INTERVALOMETER RESET BUTTON – Aircraft not Changed by T.O. 1F-100-1069. When the rocket intervalometer reset button (figure 4-26) is pressed, the intervalometer is recycled to the starting position to permit target launching. After the target is launched, again recycling the intervalometer permits actuation of the first cable-cutter squib.

CHEM & SUU-7/A SELECTOR SWITCH. Moving this switch (figure 4-26) to **OUTBD-LH** (armament selector switch at **CHEM & SUU-7/A-RELEASE** or **DISPENSERS-RELEASE** on aircraft changed by T.O. 1F-100-1069) actuates the backup cable-cutter squib when the bomb button is pressed.

PYLON LOADING SELECTOR SWITCH. It is not necessary to position the pylon loading switch at 2.75 rockets for launch and normal release of the target (the rocket firing circuits for 2.75 rockets 19 rounds), LAU series launchers, are not routed through the pylon loading switches). The left wing outboard pylon loading switch must be positioned at **CHEM & SUU-7/A** (**SUU-20** position on aircraft changed by T.O. 1F-100-1069) to provide power for actuation of the backup cable-cutter squib. Therefore, the pylon loading selector switch should be positioned at **CHEM & SUU-7/A** (**SUU-20** position in aircraft modified by T.O. 1F-100-1069) for complete operation of the tow-target system.

CAUTION

Care should be used in selecting the proper switch, to avoid disrupting release circuits for other stores.

AN/AWE-1 AIRCRAFT WEAPON RELEASE SYSTEM (AWRS) – AIRPLANES CHANGED BY T.O. 1F-100D-632.

The AWRS provides selectable store quantity, mode, and various intervals for weapon release and firing to the six

*Rocket selector switch at LH on aircraft changed by T.O. 1F-100-1069

wing store stations. The system has provisions only for release or operation of a nonnuclear weapon at the fuselage centerline station. The special store cannot be released through the AWRS. The system is actuated through the bomb button to send release signals to stations carrying such stores as selected on the armament selector switch and the station selector switches. A controller in the cockpit contains the necessary switches for making pertinent drop selections. A programmer in the fuselage equipment bay contains electronic circuitry that generates release signals under command from the controller. The AWRS is powered by the primary bus and the main 3-phase ac bus.

NOTE

On airplanes changed by T.O. 1F-100D-632D, if the programmer has been removed, the airplane's basic armament system circuitry can be used for operation of conventional external ordnance, provided the wiring harnesses which normally plug into the programmer are plugged into a bypass adapter.

- The AWE-1 (programmer) does not receive an electrical empty signal when rocket launchers and CBU dispensers are auxiliary released and, therefore, will not step inboard to the next station carrying like stores. Launchers and dispensers should be released through the normal (dispenser jettison) mode.

AWRS Controls.

AWRS QUANTITY SELECTOR SWITCH. With the AWRS quantity selector switch (figure 4-27) at OFF, electrical power is removed from all switches on the aircraft weapon release system controller and from the programmer. Turning the switch to any numbered position energizes the AWRS and provides for the quantity (number of release pulses) of the type store selected, for operation in a ripple-single or a ripple-pairs mode, in accordance with a predetermined station priority. In any step release mode, the switch can be turned to any position other than OFF.

AWRS POWER-ON LIGHT. The yellow AWRS power-on light (figure 4-27) comes on when the quantity selector

switch is at any numbered position, to indicate the AWRS is energized.

AWRS RELEASE INTERVAL SWITCH. Marked with a linear scale of from 20 through 200 in milliseconds, this switch (figure 4-27) controls store time release interval in all ripple modes. The release interval switch is used in conjunction with a multiplier switch to increase release interval. A minimum of 50 milliseconds is required to allow sufficient time for the store release relays to function reliably.

AWRS MULTIPLIER SWITCH. Moving the AWRS multiplier switch (figure 4-27) from X1 to X10 increases the time release interval in milliseconds set on the release interval switch from 20 through 200, to 200 through 2000.

AWRS RELEASE MODE SWITCH. The AWRS release mode switch (figure 4-27) provides selection for the following release or firing modes: STEP-SINGL, -PAIRS, -SALVO; RIPPLE-SINGLE, -PAIRS, -SALVO. When the switch is at any of the three step modes, the AWRS quantity selector, release interval, and multiplier switch circuits are locked out, and each depression of the bomb button applies one release or fire pulse. With the switch at RIPPLE-SINGL or RIPPLE-PAIRS, pressing and holding the bomb button applies a train of release or fire pulses. With the switch at STEP-SALVO or RIPPLE-SALVO, pressing the bomb button applies one release signal simultaneously to all stations. If all three racks of a TER are loaded, three release signals are required to release the three stores on that TER.

Operation of AN/AWE-1 Aircraft Weapon Release System (AWRS).

STATION AND TER PRIORITY. To ensure that airplane stability and control are maintained, the AWRS generates signals for release, firing, or dispensing of ordnance according to a predetermined station priority, except in salvo modes, as follows:

PRIORITY	WING STATION
1	Outboard
2	Intermediate
3	Inboard

In salvo modes, release is simultaneous from all stations. TER's retain their individual priority.

When ordnance is carried on TER's at the inboard wing stations, the priority for these stores is further broken, as follows:

PRIORITY	TER
1	Center (lower) rack
2	Left rack
3	Right rack

Each TER bomb rack requires 50 milliseconds between release pulses.

Priority operation of ordnance will result in the ordnance at the highest priority station being operated first. For example, if release of bombs is planned and they are carried only at the intermediate and inboard wing stations, the first bombs to be released will be those at the intermediate stations, since the outboard stations, in this example, are empty or have something other than bombs installed. On airplanes not changed by T.O. 1F-100D-632D, in the STEP-SINGL mode, the outboard wing stations have equal priority during bomb and fire bomb release and drop tank jettison. On airplanes changed by T.O. 1F-100D-632D, in the STEP-SINGL mode, the left outboard wing station has priority over the right outboard wing station during bomb and fire bomb release and drop tank jettison. On all airplanes, the left outboard wing station has priority over the right outboard wing station during rocket firing and dispensing of CBU bomblets. In the STEP-SINGL mode, the left intermediate and left inboard stations normally have priority over their respective right wing stations. In STEP-PAIRS, each left wing station shares equal priority with the opposite station on the right wing. In STEP-SALVO, the selected ordnance is operated simultaneously from all stations. However, the TER's retain their individual rack priority. On airplanes not changed by T.O. 1F-100D-632D, in the RIPPLE-SINGL mode, the outboard wing stations have equal priority during bomb and fire bomb release and drop tank jettison. On airplanes changed by T.O. 1F-100D-632D, in the RIPPLE-SINGL mode, the left outboard wing station has priority over the right outboard wing station during bomb and fire bomb release and drop tank jettison. On all airplanes, the left outboard wing station has priority over the right outboard wing station during rocket firing and dispensing of CBU bomblets. In the RIPPLE-SINGL mode, the left intermediate and left inboard wing stations have priority over their respective right wing stations. In RIPPLE-PAIRS, each left wing

station shares equal priority with the opposite station on the right wing. In RIPPLE-SALVO, the selected ordnance is operated simultaneously from all stations. However, the TER's retain their individual rack priority.

NOTE

When the external load emergency jettison button is pressed, the AWRS is bypassed, and all external stores, then pylons, are jettisoned.

In a RIPPLE-SINGL or a RIPPLE-PAIRS mode, if the bomb button should be released before all loads selected are released, the ripple cycle will be interrupted. If the bomb button is pressed again, the cycle will start again and the same number of stores previously selected will be released, but from the next higher priority stations.

Release Modes.

See figure 4-34 for a tabulation of store operating sequence in the various modes.

NOTE

If rocket launchers are carried at the outboard and inboard wing stations, none of the programmer controller SINGLES or PAIRS modes are effective for firing the rockets at the inboard stations. This is because empty signals cannot be generated through the rocket launchers and, consequently, the airplane's station transfer control circuits cannot be energized to permit the programmer to step to the inboard stations. Therefore, it is recommended that, regardless of the total number of launchers installed, the rockets be fired manually by use of the airplane's basic armament control circuitry (AWRS quantity selector switch OFF and selecting the related station selector switches) or with the programmer controller in STEP-SALVO or RIPPLE-SALVO modes.

STEP - SINGLE. With each depression of the bomb button, a single release signal is directed to the highest priority station in accordance with the store type selected

on the armament selector switch. If a station of next highest priority is empty or is loaded with something other than the type store selected for release, the release pulse will be continually directed down the line to the next highest priority station (of the store type selected) until all stations are depleted.

STEP — PAIRS. With each depression of the bomb button, a simultaneous release signal is directed to both highest priority stations in accordance with the store type selected on the armament selector switch. In this mode, if equal priority pairs are in asymmetrical configuration (i.e., bomb at left outboard station and rockets at right outboard station) or if one of the equal priority pairs is missing (empty station), neither weapon will release. The programmer will then direct release signals to the next highest priority pairs.

STEP — SALVO. There is no regard to station priority in this mode. With one depression of the bomb button, a simultaneous release signal is directed to each wing station carrying a store of the type selected on the armament selector switch. If a fully loaded TER is carried at each inboard wing station, the bomb button must be pressed twice more to clean the TER.

RIPPLE — SINGLE. When the bomb button is pressed and held, a train of pulses is directed to single stations

carrying stores selected on the armament selector switch. The pulses will continue in priority sequence until all stations selected are emptied, in accordance with the setting of the quantity selector switch.

RIPPLE — PAIRS. When the bomb button is pressed and held, a train of pulses is directed to pairs of highest priority stations carrying loads selected on the armament selector switch. Pulses continue in pairs in priority sequence until the number of stations selected for release are empty. The system will then stop generating release signals. In this mode, if equal priority pairs are in asymmetrical configuration (i.e., bomb at left outboard station and rockets at right outboard station) or if one of the equal priority pairs is missing (empty station), neither weapon will release. The programmer will then direct release signals to the next highest priority pairs.

RIPPLE — SALVO. There is no regard to station priority in this mode. With one depression of the bomb button, simultaneous release signal is directed to each wing station carrying a store type selected on the armament selector switch. However, since racks on a TER retain individual priority, the quantity selector switch must be properly positioned to release all stores from the TER's.

STORES OPERATING SEQUENCE USING AWRS
CBU DISPENSERS - EXCEPT CBU-24, -29, -49, -52, -53 AND -54

CONTROLLER MODE	SEQUENCE	REMARKS
STEP- SINGLES	<p>For each depression of the bomb button, one dispensing pulse is applied to a selected station.</p> <p>The dispensing pulses are applied in the normal left-right, outboard to inboard priority.</p>	<p>If dispensers are installed on the same station on both wings, the programmer will step back and forth between these stations for each dispensing pulse applied, until both dispensers are empty. Then the programmer will transfer to the next pair of stations.</p>
STEP- PAIRS	<p>For each depression of the bomb button, one dispensing pulse is applied simultaneously to the selected pair of priority stations.</p> <p>The dispensing pulses are applied in the normal outboard to inboard priority.</p>	<p>If only one station of a pair of equal priority stations is carrying a dispenser, that dispenser will not operate. The programmer will step to the next pair of equal priority stations.</p> <p>If dispensers are installed at more than one priority pair of stations, the programmer will not step to the next priority pair of stations until the dispensers on the higher priority pair of stations have been emptied.</p>
STEP- SALVO	<p>For each depression of the bomb button, one dispensing pulse is applied simultaneously to all selected stations.</p>	<p>For those dispensers which have selective tube release capability, each successive depression of the bomb button will cause additional tubes to dispense, until all the dispensers are empty.</p>
RIPPLE- SINGLES	<p>For each depression of the bomb button, the number of dispensing pulses selected are applied in train to the selected stations.</p> <p>The dispensing pulses are applied in the normal left-right, outboard to inboard priority.</p>	<p>For those dispensers which have selective tube release capability, the programmer will step from left to right on equal priority stations, but will not step to a lower priority station until the dispenser on the higher priority station has been emptied.</p>
RIPPLE- PAIRS	<p>For each depression of the bomb button, the number of dispensing pulses selected are applied in train to the selected pairs of priority stations.</p> <p>The train of dispensing pulses are applied in an outboard to inboard priority.</p>	<p>If only one station of a pair of equal priority stations is carrying a dispenser, that dispenser will not operate. The programmer will step to the next pair of equal priority stations.</p> <p>For those dispensers which have selective tube release capability, the programmer will not step to the next priority pair of stations until the dispensers on the higher priority pair of stations have been emptied.</p>
RIPPLE- SALVO	<p>For each depression of the bomb button, the number of dispensing pulses selected are applied in train simultaneously to all selected stations.</p>	<p>If the first depression of the bomb button does not dispense from all tubes of those dispensers which have selective tube release capability, succeeding depressions of the bomb button will cause dispensing from additional tubes until the dispensers are empty.</p>

NOTE

If a dispenser at an outboard station fails to operate, the AWRS will continue to apply succeeding pulses to that station and will not step to the next priority station. Dispensers at other stations must be operated manually.

- If a dispenser installed on a TER fails to dispense, the CBU empty light for the TER rack involved will not come on.

Figure 4-34 (Sheet 1 of 3)

STORES OPERATING SEQUENCE USING AWRS
BOMBS, FIRE BOMBS, LEAFLET BOMBS, LAND MINES, AND CBU-24, -29, -49, -52, -53 AND -54 DISPENSERS

CONTROLLER MODE	SEQUENCE	REMARKS
STEP- SINGLES	<p>For each depression of the bomb button, one release pulse is applied to a selected station.</p> <p>AIRPLANES CHANGED BY T.O. 1F-100D-632D Release pulses are applied in a normal left-right outboard to inboard priority.</p> <p>AIRPLANES NOT CHANGED BY T.O. 1F-100D-632D No bombs outboard: Release pulses applied in normal left-right intermediate to inboard priority. Bombs outboard: Priority for next pair of priority stations is right-left.</p>	<p>For airplanes not changed by T.O. 1F-100D-632D, bombs at the outboard stations are released simultaneously.</p> <p>If more than one bomb is installed on a TER, only one bomb will release from the TER for each release pulse applied to that station.</p>
STEP- PAIRS	<p>For each depression of the bomb button, one release pulse is applied simultaneously to the selected pair of priority stations.</p> <p>The release pulses are applied in an outboard to inboard priority.</p>	<p>If only one station of a pair of equal priority stations is carrying a bomb, that bomb will not release. The programmer will step to the next pair of equal priority stations.</p> <p>If more than one bomb is installed on a TER, only one bomb will release from each TER for each release pulse applied to those stations.</p>
STEP- SALVO	<p>For each depression of the bomb button, one release pulse is applied simultaneously to all selected stations.</p>	<p>If more than one bomb is installed on a TER, only one bomb will release from each TER for each release pulse applied to those stations.</p>
RIPPLE- SINGLES	<p>For each depression of the bomb button, the number of release pulses selected are applied in train to the selected stations.</p> <p>AIRPLANES CHANGED BY T.O. 1F-100D-632D Release pulses are applied in a normal left-right outboard to inboard priority.</p> <p>AIRPLANES NOT CHANGED BY T.O. 1F-100D-632D No bombs outboard: Release pulses applied in normal left-right intermediate to inboard priority. Bombs outboard: Priority for next pair of priority stations is right-left.</p>	<p>For airplanes not changed by T.O. 1F-100D-632D, bombs at the outboard stations are released simultaneously.</p> <p>If more than one bomb is installed on a TER, each pulse of the train of release pulses to that station will release one bomb.</p>
RIPPLE- PAIRS	<p>For each depression of the bomb button, the number of release pulses selected are applied in train to the selected pairs of priority stations.</p> <p>The train of release pulses are applied in an outboard to inboard priority.</p>	<p>If only one station of a pair of equal priority stations is carrying a bomb, that bomb will not release. The programmer will step to the next pair of equal priority stations.</p> <p>If more than one bomb is mounted on a TER, each pulse of the train of release pulses to each TER will release one bomb.</p>
RIPPLE- SALVO	<p>For each depression of the bomb button, the number of release pulses selected are applied in train simultaneously to all selected stations.</p>	<p>If more than one bomb is installed on a TER, each pulse of the train of release pulses to that station will release one bomb.</p>

NOTE

In the event a "hung-bomb" condition occurs, due to failure of the release signal to energize the release relays, the AWRS programmer will not step to the succeeding station, and the remaining stores must be released manually. When a "hung-bomb" condition is caused by a failure of a cartridge to properly fire or by a mechanical failure within the release rack, the AWRS programmer will step past the hung-bomb station to the succeeding station. When the hung bomb is on a TER, the associated TER EMPTY light will not come on.

Figure 4-34 (Sheet 2 of 2)

OPERATING LIMITATIONS



section

V

F-100D-1-0-89

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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.

INSTRUMENT MARKINGS

BASED ON JP-4 FUEL



OIL PRESSURE GAGE

- █ 40 psi MINIMUM FOR IDLE
- █ 40 - 55 psi NORMAL
- █ 55 - 60 psi CAUTION
- █ 60 psi MAXIMUM

NOTE

OIL PRESSURE WILL HAVE A TENDENCY TO FOLLOW THE THROTTLE. THIS CONDITION IS NORMAL PROVIDED PRESSURE STABILIZES BETWEEN MINIMUM AND MAXIMUM LIMITS.

HYDRAULIC PRESSURE GAGE

	FLIGHT CONTROL SYSTEM NO. 1	FLIGHT CONTROL SYSTEM NO. 2	UTILITY
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.
2800-3200 psi	NORMAL		
3200 psi	MAXIMUM		
	<p>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.</p>		

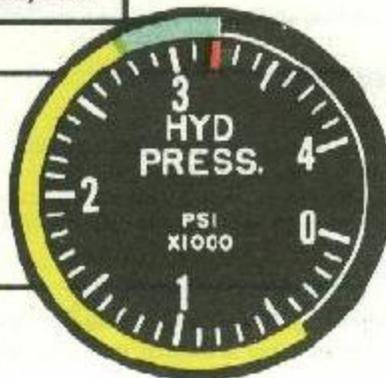


Figure 5-1 (Sheet 1 of 3)

EXHAUST TEMPERATURE GAGE



- █ 200°C MINIMUM
- █ 260°C – 610°C CONTINUOUS
- █ 680°C MAXIMUM DURING ENGINE ACCELERATION

	MAXIMUM OBSERVED EXHAUST GAS TEMPERATURE (DEGREES C)		TIME LIMITS (MINUTES)		
	SL TO 30,000 FT	30,000 FT. AND ABOVE	GROUND OPERATION	FLIGHT OPERATION	
	STARTING	450	—	—	—
OPERATING CONDITIONS	IDLE (GROUND OPERATION)	340 (1)	—	—	
	MINIMUM FOR TAKEOFF (2)	540	—	—	
	ACCELERATION (3)	680	680	2	2
	MAXIMUM CONTINUOUS (4)	580	610	CONTINUOUS	CONTINUOUS
	MAXIMUM (EXCEPT ENGINE ACCELERATION) (5)	640	670	5	15
	MILITARY (5)	630	600	15	30

- (1) Stabilized exhaust temperature at engine idle rpm normally will not exceed 340°C at 80°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.
- (2) Minimum exhaust temperature for take-off is 540°C, lower EGT is permissible if maintenance has checked the EGT and EPR system for proper calibration and the engine for proper trim.
- (3) 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 value after peaking. Two additional minutes are allowed for the temperature to drop below the limiting EGT. Exhaust temperature

should be stabilized at the normal operating temperature within 5 minutes after initial throttle advancement. It is not necessary that takeoff be delayed while EGT is stabilizing, provided the pilot monitors the EGT to insure that the applicable limits are not exceeded.

- (4) Maximum Continuous Thrust is the thrust obtained at approximately 3% engine rpm below Military Thrust rpm.
- (5) When the aircraft is flown for the maximum allowable time using maximum or military thrust, an equal amount of time should be flown at or below the maximum continuous limit prior to returning to maximum or military thrust condition.

NOTE

If temperature limits are exceeded, make entry in AFTO 781 stating duration and peak temperatures.



TACHOMETER

- █ 85%–98% Normal operating range
- █ 102% Maximum overspeed



FUEL FLOW INDICATOR

- █ 650 lb/hr Minimum
- █ 650-9000 lb/hr Continuous

Figure 5-1 (Sheet 2 of 3)

INSTRUMENT MARKINGS



AIRSPEED AND MACH NUMBER INDICATOR

 700 knots IAS maximum allowable airspeed with no external load.

NOTE

The red pointer must not be used as a limiting speed reference, since it will show airspeeds greater than the 700 knots IAS limit.

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

-  7.33 G Maximum clean (combat condition)
-  4.0 G Maximum for take-off condition with average external load
-  -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.

Figure 5-1 (Sheet 3 of 3)

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, provided EGT is also within maximum continuous limits.

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.

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.

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.

Limitations of JP-5 as an alternate fuel. Use of JP-5 in USAF turboprop engines dictates the need for observance of special precautions. For aircraft engines set for operation of JP-4 fuel, both ground starts and air restarts at low temperature may be more difficult when using JP-5, due to the negligible vapor pressure (0 psi) of JP-5. Since the freeze point of JP-5 is -51°F, aircraft will not operate at altitudes where the stagnation temperature is at or below -45°F (-42.8°C). (See figure 5-8.)

When using aviation gasoline:

1. Add 3 percent by volume Specification MIL-L-6082 Grade 1100 or Grade 1065 oil for fuel pump lubrication.
2. Make certain engine pressure ratio is within limits.
3. Do not exceed 5000-feet-per-minute rate of climb above 1500-foot altitude when fuel temperature is above 80°F.
4. 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.

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.

Figure 5-2

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 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.

AIRSPPEED LIMITATIONS DUE TO OVERHEATING OF THE AFT ELECTRONIC EQUIPMENT COMPARTMENT.

When the airplane must be flown with a known or suspected overheating of the aft electronic equipment compartment,

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 knots 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.

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 low-target mission when a dart target is installed and in the stowed position.

YAW-PITCH DAMPER SYSTEM LIMITATIONS.

The yaw-pitch damper system must not be used below 200-foot terrain clearance unless essential to operational requirements. This will preclude accidents that could result from a hard-over failure of the yaw-pitch damper system. The 200-foot terrain clearance is the minimum recovery altitude in the event of a hard-over failure of the pitch damper servo in the yaw-pitch damper system.

GUN-FIRING LIMITATIONS.

The following specific gun-firing restrictions must be observed:

1. Firing of the guns is limited to a total of 3 seconds duration, followed by a one-minute cooling period, to prevent damage to the 20 mm guns.
2. On F-100D Airplanes changed by T.O. 1F-100D-632 (armament system improvement and TER capability), the

upper 20 mm guns must not be fired as long as a store of any kind is carried on the inboard rack of either or both TER's. This restriction is required to prevent spent 20 mm casings from striking and damaging the stores or ricocheting off the stores and damaging the airplane.

FUEL SYSTEM ACCELERATION LIMITATIONS.

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 ACCELERATION LIMITATIONS.

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.**EXTERNAL STORE INDEX SYSTEM.**

A prime consideration in establishing any external store loading configuration is to ensure that satisfactory airplane handling characteristics are maintained throughout flight. To do this, center-of-gravity (CG) control is required. This control is applied first to the clean airplane and then to external store loadings.

The terminology, clean airplane CG, is defined as the CG for the basic airplane readied for flight, including the crew

aboard, full oil and full internal fuel, and the amount of 20 mm ammunition or ballast installed. (For F-100F Airplanes, this CG must be computed for the actual number of crew members aboard.) External stores and pylons are not included in the clean airplane CG calculations. The clean airplane CG is shown on the Form F (DD Form 365F) for the individual airplane. If the airplane will be flown with or without ammunition, separate Forms F should be computed showing the CG for each condition, unless both CG's can be shown on one form.

The clean airplane CG must be within the range of 29.0 to 34.0 percent MAC for F-100D Airplanes and within the range of 26.0 to 33.0 percent MAC for F-100F Airplanes.

NOTE

These clean airplane CG requirements are specified in figures 5-3 and 5-4. There is only one exception to these requirements, and that is the condition in which a specialized flight is to be made with an F-100D Airplane where no external loads are to be carried. This exception is given in a footnote in figure 5-3.

The clean airplane CG before external stores or pylons are added must be maintained within the stated limits for all flights. The clean airplane CG is the only CG which must be checked. If it is within limits and if the numerical index loading system described in the following paragraphs is properly used, satisfactory CG's for takeoff, maneuvering, and landing are assured.

External store loading configurations are regulated by use of a numerical index system. This system incorporates both the balance effect and the aerodynamic effect of adding external stores to the clean airplane. Normally, three things must be checked before an external loading configuration can be cleared for flight. They are:

1. The maximum allowable index sum.
2. The total of index numbers for all stores to be carried in a given loading configuration.
3. Store sequencing potential, if other than standard sequence is considered.

MAXIMUM ALLOWABLE INDEX SUM.

The maximum allowable index sum to be determined varies with the clean airplane CG. For example, an F-100D

Airplane with a clean airplane CG of 29.0 percent MAC has a maximum allowable index sum of 76, while an F-100D Airplane with a clean airplane CG of 33.0 percent MAC has a maximum allowable index sum of 36. The maximum allowable index sums for specific clean airplane CG's are given in figure 5-3 for F-100D Airplanes and in figure 5-4 for F-100F Airplanes. An example problem showing the use of the chart is given in each figure.

NOTE

If the maximum allowable index sum is of a fractional value, such as the 59.5 value shown in figure 5-4, round off the value to the lower whole number, in this case to 59.

STORE INDEX NUMBERS.

The index numbers for stores installed at the various airplane store stations are given in figure 5-5. All stores are listed alphanumerically. The index numbers for each store are listed at the stations where it can be carried.

NOTE

Store index numbers for F-100D and F-100F Airplanes are listed on separate sheets of figure 5-5. It is imperative that the proper index numbers be used for the airplane model involved.

There are several categories of information which require special explanation and emphasis in order to ensure correct utilization of the index numbers. Some of this information, though listed in figure 5-5, is also covered in the following paragraphs to accent its importance.

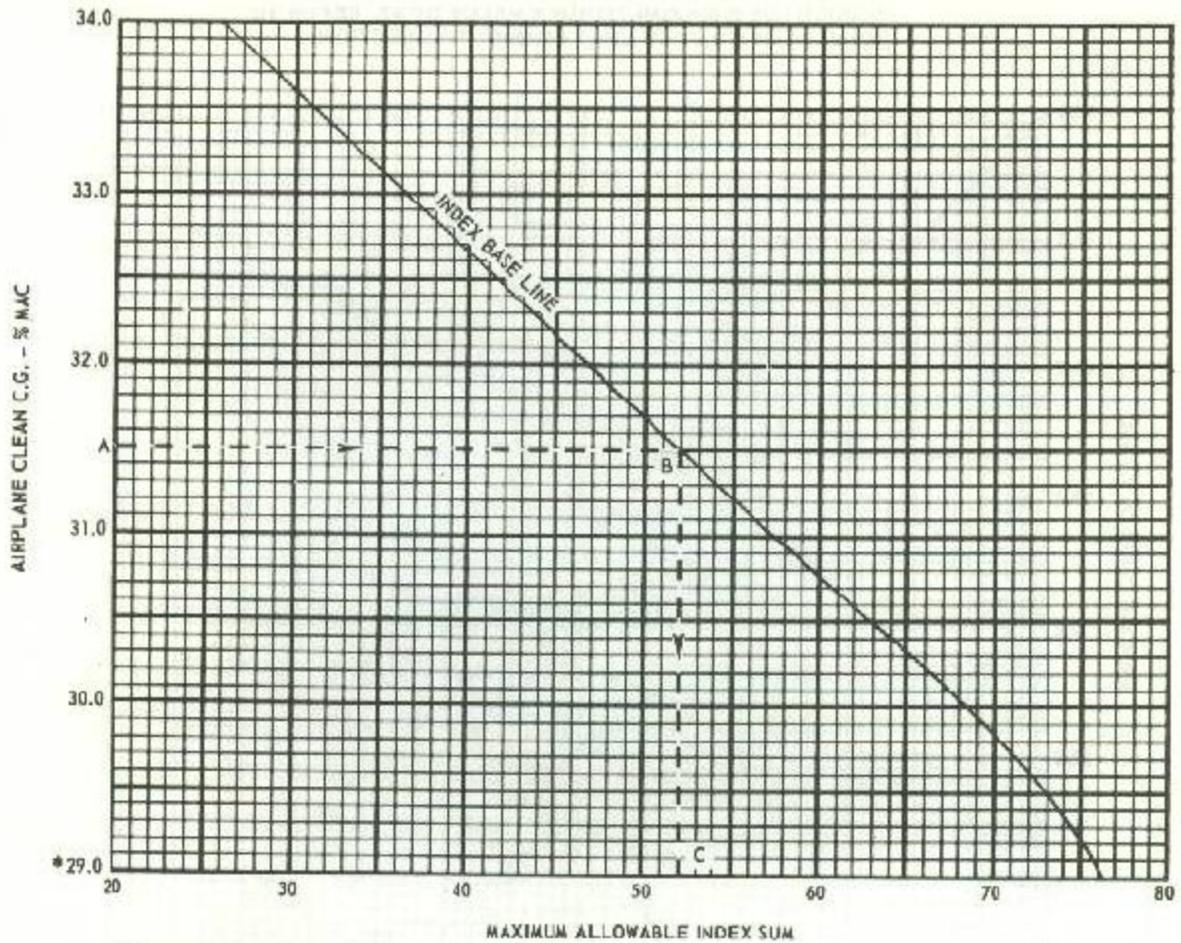
1. Each index number listed under a wing station is for a symmetrically mounted pair of identical stores, unless it is qualified in the "STORE" column as applicable only to one wing station.

2. To determine the index number for a store at one wing station only, divide the index number for the symmetrically mounted stores in half in order to obtain the single-store installation index number. For example, the index number for symmetrically mounted unfinned BLU-1/B fire bombs when carried at the outboard stations on F-100D Airplanes is 34. If only one unfinned BLU-1/B fire is to be carried outboard, with no other store at the corresponding outboard station, the index number for the one unfinned BLU-1/B fire bomb is half of 34, or 17.

F-100D EXTERNAL STORES LOADING MAXIMUM ALLOWABLE INDEX SUM

NOTE

ONLY THE MAXIMUM INDEX VALUE IS GIVEN. THERE ARE NO
MINIMUM INDEX LIMITS. EVEN NEGATIVE INDEX TOTALS ARE
ACCEPTABLE.



HOW TO USE CHART:

- A is airplane clean CG (31.5% MAC).
- B is index base line.
- C is maximum allowable index sum (52)

* For specialized flights WHERE NO EXTERNAL LOADS ARE CARRIED, clean airplane take-off CG may be as far forward as 28.0% MAC.

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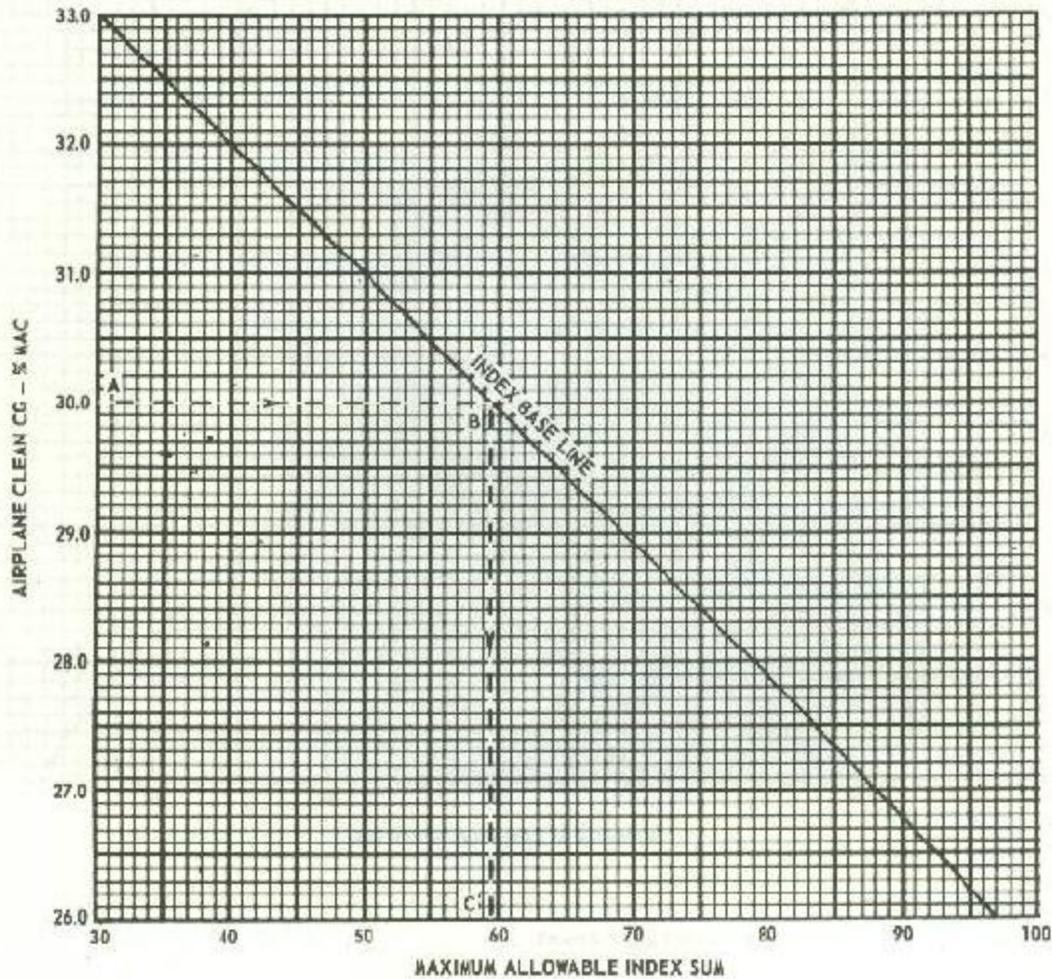
Figure 5-3

F-100F EXTERNAL STORES LOADING MAXIMUM ALLOWABLE INDEX SUM

NOTE

ONLY THE MAXIMUM INDEX VALUE IS GIVEN. THERE ARE NO MINIMUM INDEX LIMITS. EVEN NEGATIVE INDEX TOTALS ARE ACCEPTABLE.

- FOR F-100F(I) AIRCRAFT THAT HAVE A CLEAN TAKE-OFF CENTER OF GRAVITY BETWEEN 25.5 AND 26.0 PERCENT MAC SHOULD USE A MAXIMUM INDEX VALUE OF 97. REFER TO "CENTER OF GRAVITY LIMITATIONS" THIS SECTION.



HOW TO USE CHART:

- A is airplane clean CG (30.0% MAC).
- B is index base line.
- C is maximum allowable index sum (59.5).

Figure 5-4

F-100D STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

NOTE

- Item 171
- Unless stated otherwise, each index number at the wing stations is for a symmetrically mounted pair of stores.
- Index number for a store at one wing station only is one-half that given for the symmetrically mounted pair of stores.
- When pylons only or pylons and TERS are carried, the index number for each pylon or pylon and TER may be considered to be zero.
- Numbers in parenthesis in the "INDEX NUMBERS", "AIRSPEED LIMITS" and "RELEASE LIMITS" columns refer to the NOTES on Sheet 1A of this illustration.

STORE	INDEX NUMBER				AIRSPEED LIMITS NOTE	RELEASE LIMITS NOTE
	OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS			
			STORE ON PYLON	STORE ON TER		
A/A37U-15 Tow Target System (LH OUTBD STA)	33 23 (14)				Target stowed: 350 KIAS. Target launched or released: 475 KIAS. (1)	Pad and Launcher not recommended for release.
AIM-9B/E/J Missile (4 Missiles or 2 Missiles and 2 TDU-11/B Target Rockets)			-18		600 KIAS (2)	Any airspeed and between 0 G and 4.0 G. (11)
B37K-1 Practice Bomb Rack	4 BDU-33/1 or 4 MK-106	20			600 KIAS (3)	Any airspeed and between 1.0 G and 5.0 G.
	Empty	16				
BLU-1/B Fire Bomb (Unfined) BLU-1A/B and BLU-1B/B	34	25	-11	1 = -14 2 = -25	500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12) (15)
BLU-1/B Fire Bomb (Finned) BLU-1A/B and BLU-1B/B	34	25	-11		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)
BLU-1C/B Fire Bomb (Unfined)	34	26	-11	1 = -15 2 = -25	500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12) (15)
BLU-1C/B Fire Bomb (Finned)	34	25	-11		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)
BLU-27/B, B/B, C/B Fire Bomb (Unfined)	38	26	-16	1 = -18 2 = -34	500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)
BLU-27/B, B/B, C/B Fire Bomb (Finned)	39	27	-16		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)

Figure 5-5 (Sheet 1 of 15)

F-100D STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

STORE	INDEX NUMBER					AIRSPEED LIMITS	RELEASE LIMITS
	OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS		CENTERLINE STATION		
				STORE ON PYLON		STORE ON TER	NOTE
							<p>Any airspeed limit which is more restrictive than those shown below shall prevail for normal store release.</p> <p>*Release limits given in this column are for stores carried directly on pylons. For stores carried on TER's the release limits, unless those stated below are more restrictive, are as follows:</p> <p>Finned Stores: Any airspeed to 500 KIAS or Mach .90, whichever is less and between .5 G and 4.0 G.</p> <p>Unfined Stores: Any airspeed to 450 KIAS or Mach .90, whichever is less and between .5 G and 4.0 G.</p> <p>*There are no restrictions for releasing empty pylons with empty TER's installed.</p>
BLU-32A/B, B/B, C/B Fire Bomb (Finned)		31	15	-13		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G (12) (15)
BLU-32A/B, B/B, C/B Fire Bomb (Unfined)		31	15	-12		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G (12) (15)
BLU-52/B Chemical Bomb		25	24	+1		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G (12)
CBU-1A/A Dispenser (SUU-7A/A Empty)	Full	35				500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G (13)
	Empty	17					
CBU-2A/A Dispenser (SUU-7A/A Empty)	Full	38				500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G (13)
	Empty	17					
CBU-2B/A Dispenser (SUU-7B/A Empty)	Full	38				500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G (13)
	Empty	18					
CBU-2C/A Dispenser (SUU-7C/A Empty)	Full	38				500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G (13)
	Empty	18					
CBU-3A/A Dispenser (SUU-10A/A Empty)	Full	33				500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G (13)
	Empty	18					
CBU-7/A Dispenser (SUU-13/A Empty)	Full	37	27	-15		500 KIAS (3)	Dispensing: 500 KIAS to .95 Mach in 1.0 G flight. Jettisoning: 500 KIAS to .85 Mach in 1.0 G flight.
	Empty	20	23	7			
CBU-9/A Dispenser (SUU-7B/A Empty)	Full	38				500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G (13)
	Empty	17					
CBU-9A/A Dispenser (SUU-7A/A Empty)	Full	39				500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G (13)
	Empty	17					
CBU-12/A Dispenser (SUU-7B/A Empty)	Full	31				500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G (13)
	Empty	18					

Figure 5-5 (Sheet 2 of 15)

F-100D STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

STORE		INDEX NUMBER					AIRSPEED LIMITS	RELEASE LIMITS
		OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS		CENTERLINE STATION		
				STORE ON PYLON	STORE ON TER		NOTE	
CBU-12A/A Dispenser (SUU-7C/A Empty)	Full	32					500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G (13)
	Empty	19						
CBU-24/B or CBU-24A/B Cluster Dispenser		36	16	-10	1 = -11 2 = -34		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G.
CBU-24B/B Cluster Dispenser		37	16	-11	1 = -11 2 = -34		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G (15)
CBU-28/A Mine Dispenser	Full	27	24	-3			500 KIAS (3)	Dispensing: 500 KIAS to .95 Mach in 1.0 G flight. Jettisoning: 500 KIAS to .85 Mach in 1.0 G flight.
	Empty	20	23	7				
CBU-29/B or CBU-29A/B Cluster Dispenser		36	16	-10	1 = -11 2 = -34		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G.
CBU-29B/B Cluster Dispenser		37	16	-11	1 = -11 2 = -34		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G (15)
CBU-30/A Dispenser	Full	25	24	0			500 KIAS (3)	Dispensing: 500 KIAS to .95 Mach in 1.0 G flight. Jettisoning: 500 KIAS to .85 Mach in 1.0 G flight.
	Empty	20	23	7				
CBU-34/A CBU-34A/A Mine Dispenser	Full	39	27	-15			500 KIAS (3)	Dispensing: Any airspeed and 0° to 45° dive. Jettisoning: Any airspeed level 1.0 G flight.
	Empty	21	23	4				
CBU-37/A Mine Dispenser	Full	27	24	-3			500 KIAS (3)	Dispensing: 500 KIAS to .95 Mach in 1.0 G flight. Jettisoning: 500 KIAS to .85 Mach in 1.0 G flight.
	Empty	20	23	7				
CBU-42/A Mine Dispenser	Full	39	27	-15			500 KIAS (3)	Dispensing: Any airspeed and 0° to 45° dive. Jettisoning: Any airspeed level 1.0 G flight.
	Empty	21	23	4				
CBU-46/A Bomb Dispenser	Full	39					500 KIAS (3)	Dispensing: 500 KIAS and 1.0 G in 0° to 45° dive.
	Empty	19						
CBU-49/B and CBU-49A/B Cluster Dispenser		36	16	-10	1 = -12 2 = -34		600 KIAS (5)	Dispensing: Any airspeed and between 0 G and 4.0 G (15)
BU-49B/B Cluster Dispenser		37	16	-10	1 = -12 2 = -34		600 KIAS (5)	Dispensing: Any airspeed and between 0 G and 4.0 G.

Figure S-5 (Sheet 3 of 15)

F-100D STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

STORE	INDEX NUMBER				AIRSPEED LIMITS	RELEASE LIMITS	
	OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS				NOTE
			STORE ON PYLON	STORE ON TER				CENTERLINE STATION
CBU-52B/B, A/B, and B/B Dispenser	35	16	-7	1 = -11 2 = -27	550 KIAS (5)	Any airspeed limit which is more restrictive than those shown below shall prevail for normal store release. • Release limits given in this column are for stores carried directly on pylons. For stores carried on TER's the release limits, unless those stated below are more restrictive, are as follows: Finned Stores: Any airspeed to 500 KIAS or Mach .90, whichever is less and between .5 G and 4.0 G. Unfinned Stores: Any airspeed to 450 KIAS or Mach .90, whichever is less and between .5 G and 4.0 G. • There are no restrictions for releasing empty pylons with empty TER's installed.	
CBU-53/B and CBU-54/B Cluster Dispenser	37	16	-11		600 KIAS (5)	Dispensing: Any airspeed and between 0 G and 4.0 G. (12)	
KMU-342/B Guidance Kit	41	19	-8		500 KIAS (5)	Any airspeed and 0° to 45° dive 1.0 G flight (12)	
LAU-3/A and 3/D Rocket Launcher Inert, HE, HEAT, or Fletchette Warhead	Full	32			600 KIAS (6)	Any airspeed between 200 KIAS and Mach .85 in 1.0 G flight.	
	Empty	21					
M 151 Warhead	Full	33			600 KIAS (6)	Any airspeed between 200 KIAS and Mach .85 in 1.0 G flight.	
	Empty	21					
LAU-32A/A Rocket Launcher (Any Warhead)	Full	20			600 KIAS (6)	Any airspeed between 200 KIAS and Mach .85 in 1.0 G flight.	
	Empty	15					
LAU-32B/A Rocket Launcher (Any Warhead)	Full	20			600 KIAS (6)	Any airspeed and between 200 KIAS and Mach .85 in 1.0 G flight.	
	Empty	15					
LAU-59/A Rocket Launcher (Any Warhead)	Full	20			600 KIAS (6)	Any airspeed and between 200 KIAS and Mach .85 in 1.0 G flight.	
	Empty	15					
LAU-58A/A Rocket Launcher (Any Warhead)	Full	20			550 KIAS (6)	Any airspeed and between 200 KIAS and Mach .85 in 1.0 G flight.	
	Empty	16					
M117 GP Bomb	38	17	-10	1 = -11 2 = -32	600 KIAS (5)	Any airspeed and between 0 G and 4.0 G (12) (15)	
M-117GP Bomb with MAU-103A/B Fin	38	17	-10	1 = -11 2 = -32	600 KIAS (5)	Any airspeed and between 0 G and 4.0 G (12) (15)	

Figure 5-5 (Sheet 4 of 15)

F-100D STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

STORE	INDEX NUMBER					AIRSPEED LIMITS NOTE	RELEASE LIMITS NOTE
	OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS		CENTERLINE STATION		
			STORE ON PYLON	STORE ON TER			
M117(R) Bomb	39	17	10	1 - 12 2 - 33		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G (12) (15)
M117(D) Bomb	39	17	-10	1 - 12 2 - 33		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G (12) (15)
M117GP Bomb with 36 inch M1A1 Fuse Extender	38	17	-10			600 KIAS (5)	Any airspeed and between 0 G and 4.0 G (12)
M129E1 Leaflet Bomb	20	22	6			600 KIAS (5)	Any airspeed and between 0 G and 4.0 G (12)
MC-1 Chemical Bomb	32	25	-5	1 - 8 2 - 23		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G (12) (15)
MK-12 Mod O Leaflet Tank	Full	30	20	-6		500 KIAS	Any airspeed and between 1.0 G and 4.0 G.
	Empty	24	18	1			
MK-20	28	14	11	1 = .3 2 = .11 3 = .27		600 KIAS (5)	600 KIAS (5) (17)
MK-36 Mod O Destructor	29	14	-12	1 - 15 2 - 27 3 - 35		600 KIAS (5)	500 KIAS and between 0 G and 4.0 G (12) (15) (16)
MK-81 GP Bomb	21	13	-1	1 - 5 2 - 9 3 - 8		600 KIAS (5)	500 KIAS and between 0 G and 4.0 G (12) (15)
MK-82 GP Bomb	30	14	-10	1 - 14 2 - 25 3 - 31		600 KIAS (5)	500 KIAS and between 0 G and 4.0 G (12) (15)

Figure S-5 (Sheet 5 of 15)

F-100D STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

STORE		INDEX NUMBER					AIRSPEED LIMITS NOTE	RELEASE LIMITS NOTE
		OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS		CENTERLINE STATION		
				STORE ON PYLON	STORE ON TER			
MK-82 GP Bomb with M1A1 36 inch Fuze Extender	Thin Wall	30	14	-12	1 - 14 2 - 25	600 KIAS (5)	500 KIAS and between 0 G and 4.0 G (15)	
	Thick Wall	29	14	-12	3 - 31			
MK-82 Snakeye I GP Bomb		29	15	-11	1 - 14 2 - 26 3 - 32	600 KIAS (5)	500 KIAS and between 0 G and 4.0 G (12) (15) (16)	
MK-83 GP Bomb			17	.28		600 KIAS (5)	500 KIAS and between 0 G and 4.0 G (12)	
AN/ALQ - 71 ECM Pod		20				600 KIAS or Mach 1.4 (8)	Any airspeed between 200 KIAS and Mach .85 in 1.0 G flight.	
AN/ALQ - 72 ECM Pod		19				600 KIAS or Mach 1.4 (8)	Any airspeed between 200 KIAS and Mach .85 in 1.0 G flight.	
AN/ALQ - 87 ECM Pod		23				600 KIAS or 1.4 Mach (8)	Any airspeed between 200 KIAS and Mach .85 in 1.0 G flight.	
BDU - 33 () Bomb					1 - 2 2 - 4 3 - 6	600 KIAS (5)	500 KIAS and between 0 G and 4.0 G (12) (15)	
SUU-20/A and Practice Dispenser	6 BDU 33 () Bombs	30				450 KIAS or Mach .95	450 KIAS in 1.0 G flight. (9)	
	4 Rockets	29						
	6 BDU 33 () Bombs plus 4 Rockets	33						
	Empty	28						
SUU-20/A (M) SUU-20A/A and SUU-20B/A Practice Dispenser	6 BDU 33 () Bombs	33				450 KIAS or Mach .95	450 KIAS in 1.0 G flight. (9)	
	4 Rockets	32						
	6 BDU 33 () Bombs plus 4 Rockets	36						
	Empty	29						
SUU-21/A Practice Dispenser (LH INTM STA OR CL)	6 BDU 33/B Bombs		13			600 KIAS	Not recommended for release under any flight condition because dispenser may strike airplane.	
	6 MK-106 Bombs		13					
	Empty		13					

Figure 5-5 (Sheet 6 of 15)

F-100D STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

STORE	INDEX NUMBER					AIRSPEED LIMITS NOTE Airspeed limits given in this column are for stores carried directly on pylons. For stores carried on TER's, the airspeed limit, unless those stated below are more restrictive, is 500 KIAS or Mach .90, whichever is less.	RELEASE LIMITS NOTE Any airspeed limit which is more restrictive than those shown below shall prevail for normal store release. • Release limits given in this column are for stores carried directly on pylons. For stores carried on TER's the release limits, unless those stated below are more restrictive, are as follows: Finned Stores: Any airspeed to 500 KIAS or Mach .90, whichever is less and between .5 G and 4.0 G. Unfined Stores: Any airspeed to 450 KIAS or Mach .80, whichever is less and between .5 G and 4.0 G. • There are no restrictions for releasing empty pylons with empty TER's installed.
	OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS		CENTERLINE STATION		
			STORE ON PYLON	STORE ON TER			
SUU-25A/A Flare Dispenser	Full	25				450 KIAS or Mach .90	Any airspeed between 200 KIAS and Mach .85 in 1.0 G flight.
	Empty	18					
SUU-25B/A Flare Dispenser	Full	28				500 KIAS or Mach .95	Any airspeed between 200 KIAS and Mach .85 in 1.0 G flight.
	Empty	19					
SUU-25C/A Flare Launcher	Full	28				500 KIAS or Mach .95	Any airspeed and between 250 KIAS and 375 KIAS in 1.0 G flight.
	Empty	19					

*(5) 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.

** (15) Minimum ripple release rate is 0.050 seconds, for munitions carried on TER's.

Figure 5-5 (Sheet 7 of 15)

F-100D STORE INDEX NUMBERS, AIRSPEED LIMITS AND RELEASE LIMITS

DROP TANK COMBINATIONS

NOTE

Takeoff with partially filled baffled 450, 335 or type III 275 gallon drop tanks is permissible providing the full tank store index number is increased by 10 for each 450 gallon drop tank and by 7 for each 335 or 275 gallon drop tank. Drop tanks containing less than 125 gallons each, at time of engine start, may be considered empty for purposes of determining index numbers only.

- Each set of two index numbers on this page applies only to the specific drop tank configuration listed alongside it. The index numbers not in brackets apply to a drop tank configuration as long as any of the tanks in the original configuration remain installed. The index numbers in brackets apply after all the tanks originally installed have been released and may be used, if necessary, to permit flexibility in releasing or dispensing other types of stores installed.
- The unbracketed index numbers for the various drop tank combinations shown on this page apply only when all tanks in a given configuration are either full or empty prior to engine start. There is no acceptable, simple method of presenting valid index numbers for the many possible combinations of full, partially full, and empty drop tanks.
- Drop tank configurations not shown on this page may not be flown.

					INDEX NO.	AIRSPEED LIMITS	RELEASE LIMITS
		200 GAL TANK	200 GAL TANK		26 [11]	TANKS WITH FUEL	NOTE Any airspeed limitation which is more restrictive than those shown below shall prevail for normal store release.
	200 GAL TANK			200 GAL TANK	36 [18]	Type III 335 gallon tank ... 390 KIAS	
	275 GAL TANK			275 GAL TANK	33 [18]	NAA Type III 275 gallon tank ... 500 KIAS Type II 275 gallon tank ... 450 KIAS or Mach .95, whichever is less	
	335 GAL TANK			335 GAL TANK	42 * [12]	Type IV 200 gallon tank ... 450 KIAS or Mach .95, whichever is less	FULL DROP TANKS Any airspeed in level flight (1 G)
	450 † GAL TANK			450 † GAL TANK	44 [14]	Type II 450 gallon tank ... 375 KIAS or Mach .95, whichever is less	PARTIALLY FULL DROP TANKS Not recommended for drop, because partially full drop tanks may tumble and strike the airplane when released.
	275 GAL TANK	200 GAL TANK	200 GAL TANK	275 GAL TANK	49 [12]	EMPTY TANKS	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.
	335 GAL TANK	200 GAL TANK	200 GAL TANK	335 GAL TANK	58 [10]	Type III 335 gallon tank ... 600 KIAS NAA Type III 275 gallon tank ... 600 KIAS	
				275 GAL TANK	23 [14]	Type II 275 gallon tank ... 600 KIAS or Mach .95, whichever is less	EMPTY 275- AND 335-GALLON DROP TANKS WITH NO ADJOINING OUTBOARD STORES Any altitude (not less than 50 feet above the terrain) and any airspeed between 250 knots IAS and Mach 1.0 in level flight (1 G).
				335 GAL TANK	27 [15]	Type IV 200 gallon tank (at other than inboard stations) ... 600 KIAS or Mach .95, whichever is less	
				450 † GAL TANK	30 [13]	Type II 200 gallon tank (at inboard stations) ... 500 KIAS or Mach .95, whichever is less	EMPTY 275- AND 335-GALLON DROP TANKS WITH ANY APPROVED STORE AT THE ADJOINING OUTBOARD STATION EXCEPT MA-3 ROCKET ADAPTER OR B37K-1 BOMB RACK Any altitude to 30,000 feet (and not less than 50 feet above the terrain) and any airspeed between 305 and 430 knots IAS but not above Mach .95.
	275 GAL TANK		200 GAL TANK	275 GAL TANK	40 [11]	Type II 450 gallon tank ... 550 KIAS or Mach .95, whichever is less	
	335 GAL TANK		200 GAL TANK	335 GAL TANK	48 [11]	Four empty tank configuration ... 500 KIAS or Mach .95, whichever is less	
		200 GAL TANK	200 GAL TANK	275 GAL TANK	37 [10]	Three empty tanks and Special Store (or equivalent practice shape) ... 500 KIAS or Mach .95, whichever is less	CAUTION Do not drop empty 275- or 335-gallon droptanks if an MA-3 rocket adapter or B37K-1 bomb rack is installed at the adjoining outboard station.
		200 GAL TANK	200 GAL TANK	335 GAL TANK	41 [9]		
	200 GAL TANK		200 GAL TANK	275 GAL TANK	46 [5]	NOTE If drop tanks contain fuel and internal fuel is less than 4000 pounds, do not exceed 450 KIAS for NAA Type III 275 gallon tanks, 400 KIAS for Type II 275 gallon tanks, 370 KIAS for Type III 335 gallon tanks, or 340 KIAS for Type II 450 gallon tanks.	EMPTY 200- AND 450-GALLON DROP TANKS Any altitude and any airspeed above 200 knots IAS in level flight (1 G).
	200 GAL TANK		200 GAL TANK	335 GAL TANK	50 [4]		

* When outboard stores are carried and they are released or expended before ammunition is fired, this index number may be reduced by the lesser of the two following values: by 9; or by the difference between the outboard store index before use and after use (releasing or dispensing). When ammunition is not carried, the reduction for this index number can always be 9.

† Stores must not be carried in TER's when 450-gallon tanks are carried at the adjacent intermediate station or stations.

100D-1-A-93-14

Figure 5-5 (Sheet 8 of 15)

F-100F STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

NOTE

Unless stated otherwise, each index number at the wing stations is for a symmetrically mounted pair of stores.

- Index number for a store at one wing station only is one-half that given for the symmetrically mounted pair of stores.
- When pylons only are carried, the index number for each pylon may be considered to be zero.
- Numbers in parenthesis in the "AIRSPEED LIMITS" and "RELEASE LIMITS" columns refer to the NOTES on Sheet 14 of this illustration.
- Stores followed by - Item 174.

STORE	INDEX NUMBER				AIRSPEED LIMITS	RELEASE LIMITS NOTE
	OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS	CENTERLINE STATION		
A/A37U-15 Tow Target System (LH OUTBD STA)	30				Target stowed: 350 KIAS. Target launched or released: 475 KIAS. (1)	Pod and Launcher not recommended for release.
AIM9B/J Missile (4 Missiles or 2 Missiles and 2 TDU-11/B Target Rockets)			-17		600 KIAS (2)	Any airspeed and between 0 G and 4.0 G. (11)
B37K-1 Practice Bomb Rack	4 BDU 33/1 or 4 MK-106	19			600 KIAS (3)	Any airspeed and between 1.0 G and 5.0 G.
	Empty	16				
BLU-1/B Fire Bomb (Unfinned) BLU-1A/B and BLU-1 B/B	33	27	-9		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)
BLU-1/B Fire Bomb (Finned) BLU-1A/B and BLU-1 B/B	34	28	-9		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)
BLU-1C/B Fire Bomb (Unfinned)	33	27	-7		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)
BLU-1 C/B Fire Bomb (Finned)	34	28	-9		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)
BLU-27/B, B/B, C/B Fire Bomb (Unfinned)	37	28	-14		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)
BLU-27/B, B/B, C/B Fire Bomb (Finned)	38	29	-14		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)
BLU-32A/B, B/B, C/B Fire Bomb (Unfinned)	31	16	-9		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)
BLU-32A/B, B/B, C/B Fire Bomb (Finned)	31	17	-9		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G. (12)

Figure 5-5 (Sheet 9 of 15)

F-100F STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

STORE	INDEX NUMBER				AIRSPEED LIMITS	RELEASE LIMITS NOTE Any airspeed limits which is more restrictive than those shown below shall prevail for normal store release.
	OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS	CENTERLINE STATION		
BLU-52/B Chemical Bomb	25	25	4		500 KIAS (3)	Any airspeed and between 0 G and 4.0 G (12)
CBU-1A/A Dispenser (SUU-7A/A Empty)	Full	35			500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G. (13)
	Empty	17				
CBU-2A/A Dispenser (SUU-7A/A Empty)	Full	38			500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G. (13)
	Empty	17				
CBU-2B/A Dispenser (SUU-7B/A Empty)	Full	38			500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G. (13)
	Empty	18				
CBU-2C/A Dispenser (SUU-7B/A Empty)	Full	38			500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G. (13)
	Empty	18				
CBU-3A/A Dispenser (SUU-10A/A Empty)	Full	32			500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G. (13)
	Empty	17				
CBU-7/A Dispenser (SUU-13/A Empty)	Full	37	29	-11	500 KIAS (3)	Dispensing: 500 KIAS to .95 Mach in 1.0 G flight. Jettisoning: 500 KIAS to .85 Mach in 1.0 G flight
	Empty	19	23	9		
CBU-9A/A Dispenser (SUU-7B/A Empty)	Full	38			500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G. (13)
	Empty	17				
CBU-9B/A Dispenser (SUU-7C/A Empty)	Full	38			500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G. (13)
	Empty	17				
CBU-12A/A Dispenser (SUU-7B/A Empty)	Full	31			500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G. (13)
	Empty	17				
CBU-12A/A Dispenser (SUU-7C/A Empty)	Full	32			500 KIAS (3)	Full: Any airspeed and between 0 G and 4.0 G. (13)
	Empty	19				
CBU-24/B or CBU-24A/B Cluster Dispenser	36	18	-8		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G.
CBU-24B/B Cluster Dispenser	37	18	-7		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G.
CBU-28/A Mine Dispenser	Full	27	25	1	500 KIAS (3)	Dispensing: 500 KIAS to .95 Mach in 1.0 G flight. Jettisoning: 500 KIAS to .85 Mach in 1.0 G flight
	Empty	19	23	9		
CBU-29/B or CBU-29A/B Cluster Dispenser	36	18	-8		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G.
CBU-29B/B Cluster Dispenser	36	18	-7		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G.

Figure 5-5 (Sheet 10 of 15)

F-100F STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

STORE		INDEX NUMBER				AIRSPEED LIMITS	RELEASE LIMITS NOTE Any airspeed limit which is more restrictive than those shown below shall prevail for normal store release.
		OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS	CENTERLINE STATION		
CBU-30/A Dispenser	Full	25	25	3		500 KIAS (3)	Dispensing: 500 KIAS to .95 Mach in 1.0 G flight. Jettisoning: 500 KIAS to .85 Mach in 1.0 G flight.
	Empty	19	23	9			
CBU-34/A or CBU-34A/A Mine Dispenser	Full	39	29	-13		500 KIAS (3)	Dispensing: Any airspeed and 0° to 45° dive. Jettisoning: Any airspeed and level 1.0 G flight.
	Empty	21	24	7			
CBU-37/A Mine Dispenser	Full	27	25	1		500 KIAS (3)	Dispensing: 500 KIAS to .95 Mach in 1.0 G flight. Jettisoning: 500 KIAS to .85 Mach in 1.0 G flight.
	Empty	19	23	9			
CBU-42/A Mine Dispenser	Full	39	29	-13		500 KIAS (3)	Dispensing: Any airspeed and 0° to 45° dive. Jettisoning: Any airspeed and level 1.0 G flight.
	Empty	21	24	7			
CBU-46/A Bomb Dispenser	Full	39				500 KIAS	Dispensing: 500 KIAS and 1.0 G between 0° to 45° dive.
	Empty	19					
CBU-49/B and CBU-49A/B Cluster Dispenser		36	18	-8		600 KIAS (5)	Dispensing: Any airspeed and between 0 G and 4.0 G
CBU-49B/B Cluster Dispenser		37	18	-7		600 KIAS (5)	Dispensing: Any airspeed and between 0 G and 4.0 G.
CBU-52 B/B Dispenser		34	18	-3		550 KIAS (5)	Any airspeed and between 0 to 4.0 G
CBU-53/B and CBU-54/B Cluster Dispenser		36	18	-7		600 KIAS (5)	Dispensing: Any airspeed and between 0 G and 4.0 G. (12)
CBU-58/B, A/B, -71/B, A/B Dispensers		36	18	-7		600 KIAS (5)	Any airspeed and between 0 and 4.0 G.
KMU-342/B Bomb		41	21	-7		500 KIAS (5)	Any airspeed and 0° to 45° dive 1.0 G flight. (12)
LAU-3/A Rocket Launcher (Inert, HE, HEAT, or Fletchette Warhead)	Full	31				600 KIAS (6)	Any airspeed and between 200 KIAS and Mach .85 in 1.0 G flight.
	Empty	21					
M-151 Warhead	Full	33				600 KIAS (6)	Any airspeed and between 200 KIAS and Mach .85 in 1.0 G flight.
	Empty	21					
LAU-32A/A Rocket Launcher (Any Warhead)	Full	20				600 KIAS (6)	Any airspeed and between 200 KIAS and Mach .85 in 1.0 G flight.
	Empty	15					
LAU-32B/A Rocket Launcher (Any Warhead)	Full	20				600 KIAS (6)	Any airspeed and between 200 KIAS and Mach .85 in 1.0 G flight.
	Empty	15					
LAU-59/A Rocket Launcher (Any Warhead)	Full	20				600 KIAS (6)	Any airspeed and between 200 KIAS and Mach .85 in 1.0 G flight.
	Empty	15					
LAU-68A/A Rocket Launcher (Any Warhead)	Full	20				550 KIAS (6)	Any airspeed and between 200 KIAS and Mach .85 in 1.0 G flight.
	Empty	16					

F-100F STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

STORE	INDEX NUMBER				AIRSPEED LIMITS	RELEASE LIMITS NOTE Any airspeed limit which is more restrictive than those shown below shall prevail for normal store release.
	OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS	CENTERLINE STATION		
M117 GP Bomb	37	19	-7		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G. (12)
M117 GP Bomb with MAJ-103A/B Fin	37	19	-7		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G. (12)
M117(R) GP Bomb	39	19	-7		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G. (12)
M117(DI) Destructor	39	19	-8		500 KIAS (5)	Any airspeed and between 0 G and 4.0 G. (12)
M117 GP Bomb with 36 inch MIAI Fuse Extender	37	19	-7		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G. (12)
M129E1 Leaflet Bomb	19	23	7		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G. (12)
MC-1 Chemical Bomb	32	27	-3		600 KIAS (5)	Any airspeed and between 0 G and 4.0 G. (12)
MK-12 Mod 0 Leaflet Tank	Full	29	21	-2	500 KIAS	Any airspeed and between 1.0 G and 4.0 G.
	Empty	24	19	4		
MK-20		28	16	5	600 KIAS (5)	600 KIAS (5) (17)
MK-36 Mod 0		30	18	-8	600 KIAS (5)	500 KIAS and between 0 G and 4.0 G. (12) (16)
MK-81 GP Bomb		21	13	0	600 KIAS (5)	500 KIAS and between 0 G and 4.0 G. (12)
MK-82 GP Bomb		29	16	-9	600 KIAS (5)	500 KIAS and between 0 G and 4.0 G. (12)
MK-82 GP Bomb with MIAI 36 inch Fuse Extender	Thin Wall	29	16	-8	600 KIAS (5)	500 KIAS and between 0 G and 4.0 G. (12)
	Thick Wall	29	16	-8		

Figure 5-5 (Sheet 12 of 15)

F-100F STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

STORE		INDEX NUMBER				AIRSPEED LIMITS	RELEASE LIMITS NOTE Any airspeed limit which is more restrictive than those shown below shall prevail for normal store release.
		OUTBOARD STATIONS	INTERMEDIATE STATIONS	INBOARD STATIONS	CENTERLINE STATION		
MK-82 Snakeye 1 GP Bomb		30	16	-9		600 KIAS (5)	500 KIAS and between 0 G and 4.0 G (12) (16)
MK-83 GP Bomb			20	-26		600 KIAS (5)	500 KIAS and between 0 G and 4.0 G (12)
SUU 20/A and Practice Dispenser	6 BDU-33() Bombs	30				450 KIAS or Mach .95	450 KIAS in 1.0 G flight. (9)
	4 Rockets	28					
	6 BDU-33() Bombs plus 4 Rockets	32					
	Empty	26					
SUU 20/A IMI and SUU 20A/A, B/A Practice Dispenser	6 BDU-33() Bombs	33				450 KIAS or Mach .95	450 KIAS in 1.0 G flight. (9)
	4 Rockets	31					
	6 BDU-33() Bombs plus 4 Rockets	36					
	Empty	29					
SUU 21/A Practice Dispenser (LH INTM STA OR CL)	6 BDU-33/B Bombs		14		7	600 KIAS	Not recommended for release under any flight condition because dispenser may strike airplane.
	6 MK-106 Bombs		14		7		
	Empty		14		8		
SUU 25 A/A Flare Dispenser	Full	25				450 KIAS or Mach .90	Any airspeed between 200 KIAS and Mach .85 in 1.0 G flight.
	Empty	18					
SUU 25B/A Flare Dispenser	Full	27				500 KIAS or Mach .95	Any airspeed between 200 KIAS and Mach .85 in 1.0 G flight.
	Empty	18					
SUU 25C/A Flare Launcher F-100F	Full	27				500 KIAS or Mach .95	Any airspeed and between 250 KIAS and 375 KIAS in 1.0 G flight.
	Empty	18					

Figure 5-5 (Sheet 13 of 15)

F-100F STORE INDEX NUMBERS, AIRSPEED LIMITS AND RELEASE LIMITS

DROP TANK COMBINATIONS

NOTE

Takeoff with partially filled baffled 450, 335 or type III 275 gallon drop tanks is permissible providing the full tank store index number is increased by 10 for each 450 gallon drop tank and by 7 for each 335 or 275 gallon drop tank. Drop tanks containing less than 125 gallons each, at time of engine start, may be considered empty for purposes of determining index numbers only.

- Each set of two index numbers on this page applies only to the specific drop tank configuration listed alongside it. The index numbers not in brackets apply to a drop tank configuration as long as any of the tanks in the original configuration remain installed. The index numbers in brackets apply after all the tanks originally installed have been released and may be used, if necessary, to permit flexibility in releasing or dispensing other types of stores installed.
- The unbracketed index numbers for the various drop tank combinations shown on this page apply only when all tanks in a given configuration are either full or empty prior to engine start. There is no acceptable, simple method of presenting valid index numbers for the many possible combinations of full, partially full, and empty drop tanks.
- Drop tank configurations not shown on this page may not be flown.

					INDEX NO.	AIRSPEED LIMITS	RELEASE LIMITS
					21 [0]	<p style="text-align: center;">TANKS WITH FUEL</p> <p>Type III 335 gallon tank... 390 KIAS NAA Type III 275 gallon tank 500 KIAS Type II 275 gallon tank... 450 KIAS or Mach .95, whichever is less Type IV 200 gallon tank... 450 KIAS or Mach .95, whichever is less Type II 450 gallon tank... 375 KIAS or Mach .95, whichever is less</p>	<p style="text-align: center;">NOTE</p> <p>Any airspeed limitation which is more restrictive than those shown below shall prevail for normal store release.</p>
200 GAL TANK			200 GAL TANK		38 [6]		
275 GAL TANK			275 GAL TANK		36 [4]		
335 GAL TANK			335 GAL TANK		40 [4]		
450 GAL TANK			450 GAL TANK		49 [2]		
275 GAL TANK	200 GAL TANK	200 GAL TANK	275 GAL TANK		44 [0]		
335 GAL TANK	200 GAL TANK	200 GAL TANK	335 GAL TANK		53 [0]		
			275 GAL TANK		25 [3]		
			335 GAL TANK		28 [3]		
			450 GAL TANK		31 [9]		
275 GAL TANK		200 GAL TANK	275 GAL TANK		39 [5]	<p style="text-align: center;">EMPTY TANKS</p> <p>Type III 335 gallon tank... 600 KIAS NAA Type III 275 gallon tank 600 KIAS Type II 275 gallon tank... 600 KIAS or Mach .95, whichever is less Type IV 200 gallon tank (at other than inboard stations) 600 KIAS or Mach .95, whichever is less Type II 200 gallon tank (at inboard stations)..... 500 KIAS or Mach .95, whichever is less Type II 450 gallon tank... 550 KIAS or Mach .95, whichever is less Four empty tank configuration 500 KIAS or Mach .95, whichever is less Three empty tanks and Special Store (or equivalent practice shape) 500 KIAS or Mach .95, whichever is less</p> <p style="text-align: center;">NOTE</p> <p>If drop tanks contain fuel and internal fuel is less than 4000 pounds, do not exceed 450 KIAS for NAA Type III 275 gallon tanks, 400 KIAS for Type II 275 gallon tanks, 370 KIAS for Type III 335 gallon tanks, or 340 KIAS for Type II 450 gallon tanks.</p>	<p style="text-align: center;">FULL DROP TANKS</p> <p>Any airspeed in level flight (1 G)</p> <p style="text-align: center;">PARTIALLY FULL DROP TANKS</p> <p>Not recommended for drop, because partially full drop tanks may tumble and strike the airplane when released.</p> <p style="text-align: center;">NOTE</p> <p>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.</p> <p style="text-align: center;">EMPTY 275- AND 335-GALLON DROP TANKS WITH NO ADJOINING OUTBOARD STORES</p> <p>Any altitude (not less than 50 feet above the terrain) and any airspeed between 250 knots IAS and Mach 1.0 in level flight (1 G).</p> <p style="text-align: center;">EMPTY 275- AND 335-GALLON DROP TANKS WITH ANY APPROVED STORE AT THE ADJOINING OUTBOARD STATION EXCEPT MA-3 ROCKET ADAPTER OR B37K-1 BOMB RACK</p> <p>Any altitude to 30,000 feet (and not less than 50 feet above the terrain) and any airspeed between 265 and 430 knots IAS but not above Mach .95.</p> <p style="text-align: center;">CAUTION</p> <p>Do not drop empty 275- or 335-gallon drop tanks if an MA-3 rocket adapter or B37K-1 bomb rack is installed at the adjoining outboard station.</p> <p style="text-align: center;">EMPTY 200- AND 450-GALLON DROP TANKS</p> <p>Any altitude and any airspeed above 200 knots IAS in level flight (1 G).</p>
335 GAL TANK		200 GAL TANK	335 GAL TANK		41 [0]		
	200 GAL TANK	200 GAL TANK	275 GAL TANK		32 [0]		
	200 GAL TANK	200 GAL TANK	335 GAL TANK		37 [0]		
200 GAL TANK		200 GAL TANK	275 GAL TANK		39 [0]		
200 GAL TANK	200 GAL TANK	200 GAL TANK	335 GAL TANK		44 [0]		

* 200-gallon tanks must not be carried at the inboard wing station in 2-store or 3-store symmetrical loading configurations.

Figure 5-5 (Sheet 14 of 15)

F-100D AND F-100F STORE INDEX NUMBERS, AIRSPEED LIMITS, AND RELEASE LIMITS

NOTES:

1. Do not exceed Mach .95 with target launched or Mach 1.1 with target released.
2. AIM9B/J Missiles with Mod 3 guidance and control heads may encounter buffeting at speeds of 375 to 425 KIAS; if buffeting is encountered airspeed should be changed as rapidly as possible to get out of the critical speed region.
3. Do not exceed Mach .95 below 25,000 feet or Mach 1.0 above 25,000 feet.
4. Do not exceed Mach .95 for symmetrical installations of these stores or Mach .90 for asymmetrical installations of these stores.
5. 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.
6. When rocket launchers 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.
7. Do not exceed Mach .95 below 30,000 feet when carried on wing station.
8. With a pod at one outboard station only, do not exceed Mach 1.2.
9. SUU-20 Practice Dispensers must be released full or empty.
10. (Not used).
11. When only one missile or 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.
12. Low drag general purpose bombs (with or without fuse extenders) and finned napalm bombs may be salvoed in the armed condition from the inboard and outboard wing stations ONLY (with or without fuel tanks on the intermediate station). Otherwise DO NOT salvo bombs in the armed condition, as the bombs may collide, detonate, and damage the airplane.
13. 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 KIAS in straight and level (1 G) flight.
14. Tow target must be carried with 275/335-gallon tanks at the intermediate stations, inboard stations must be clean. Drop tanks must be full or empty prior to engine start. Ammunition, if carried, must not be fired as long as the tow target pod is installed.
15. Minimum ripple release rate is 0.060 seconds (60 milliseconds), for munitions carried on TER's.
16. The MK-15 Mod 3A and 4 tail fins are restricted to 500 KIAS maximum release speed when released high drag. The MK-3 tail fin is restricted to 400 KIAS maximum release speed when released high drag. The MK-3 MOD 0, 1 or 2 tail fin may not be released high drag.
17. Minimum ripple release rate is 0.100 seconds (100 milliseconds) for MK-20 bombs on TER's.

3. For F-100D Airplanes, there are two types of inboard station index numbers, one type for stores carried directly on a pylon, the other type for a store or stores carried on TER's. In the latter case, there are two or three index numbers listed. They apply when one, two, or three stores are carried on the TER's. Using hypothetical numbers for an example, the following explains how to interpret the index number listings for stores carried on TER's:

- 1 = -9 means that the index number for two identical stores on the TER's (one store per TER) is -9.
- 2 = -20 means that the index number for four identical stores on the TER's (two stores per TER) is -20.
- 3 = -28 means that the index number for six identical stores on the TER's (three stores per TER) is -28.

CAUTION

When stores that have negative index values are to be released prior to other stores carried, the sum of the indexes of the remaining stores must be less than the maximum allowable index sum in all cases. When planning release of stores from the inboard station first, ascertain that the configuration after release will still be within the maximum allowable index sum.

NOTE

The "STORE ON TER" column is applicable only to airplanes changed by T.O. 1F-100D-632.

- When only one store is to be loaded on a TER, it must be loaded on the bottom rack. If two stores are to be loaded on a TER, they must be loaded on the side racks.

4. For dispenser-type stores, such as the CBU-1A/A and the LAU-3/A, an index number is given for both the full and empty conditions. The index number for the empty condition can, under certain circumstances, be used to

permit flexibility of store and ammunition utilization in flight. This capability is covered in one of the sample problems at the end of this presentation.

5. In the "AIRSPEED LIMITS" and "RELEASE LIMITS" columns in figure 5-5, there are parenthetical numbers at the end of many of the stated limits. These parenthetical numbers refer to notes on the last sheet of the figure which in some way qualify or elaborate on the basic limit.

6. For both the F-100D and the F-100F, specific combinations of drop tanks are listed, each combination with its own index number. There are two index numbers for each drop tank combination. The number that is not in brackets must be used in initially computing the index sum for the over-all configuration. The number that is in brackets is what is termed a residual index number and may, under certain circumstances, be used after all of the drop tanks have been released in order to possibly gain flexibility in releasing or dispensing ordnance-type stores. It might be thought that the residual index number, once all the drop tanks had been released, could always be reduced to zero. However, such is not the case, because the conditions of airplane weight and CG occurring throughout a mission for an airplane without drop tanks installed would not be duplicated by an airplane which had carried drop tanks, even if the tanks were dropped somewhere during the flight.

NOTE

Takeoff with partially filled baffled 450, 335, or type III 275 gallon drop tanks is permissible providing the full tank store index number is increased by 10 for each 450 gallon drop tank and by 7 for each 335 or 275 gallon drop tank. Drop tanks containing less than 125 gallons each, at time of engine start, may be considered empty for purposes of determining index numbers only.

MAXIMUM ALLOWABLE AIRSPEEDS.

No External Stores or Empty Pylons.

The maximum allowable airspeed for the airplane with no external stores or with empty pylons is 700 knots IAS. The limit shown in figure 5-1 is for this condition.

With External Stores.

Four major factors affect the maximum airspeed which the airplane may attain when carrying external stores: 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 over-all configuration. Any one or any combination of these factors may determine the maximum allowable airspeed. The maximum allowable airspeeds for the airplane when carrying external stores are presented in figure 5-5 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 for the individual stores carried. For example, if MK-83 bombs and NAA Type III 275-gallon drop tanks containing fuel are carried, the maximum allowable airspeed is 500 knots IAS. If the bomb Mach limit (Mach .90 below 10,000 feet, Mach .95 from 10,000 to 25,000 feet, or 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 a qualifying note in the "AIRSPEED LIMITS" column for the drop tank configurations in figure 5-5. 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 600 knots IAS or the stated bomb Mach limit, whichever is lower.

Strike Camera Installations.

On airplanes with the fuselage-mounted KA-71A or KB-18A strike camera, adequate directional control cannot be maintained at high airspeed/Mach numbers. Therefore, the following airspeed limits must be observed on airplanes with this camera installation:

1. Do not exceed Mach 1.0 or 560 knots IAS, whichever is lower.

2. If higher Mach numbers must be flown, reduce indicated airspeed limit 35 knots IAS for each 0.1 Mach number above Mach 1.0, as indicated in the following table:

INDICATED AIRSPEED		INDICATED MACH
560	or	1.0
525	or	1.1
490	or	1.2
455	or	1.3
420	or	1.4
400	or	1.47

NOTE

If external stores are installed and require lower airspeed and/or Mach limits, the lower limits must be observed.

Combat Documentation Camera Pod Installation.

On airplanes with the wing-mounted combat documentation camera, adequate directional control cannot be maintained at high Mach numbers. Therefore, do not exceed Mach .95 on airplanes with this camera installation.

ACCELERATION LIMITATIONS.

The acceleration limits shown in figure 5-1 are for the airplane with no external stores and for an average external loading configuration. The operating flight limits diagrams (figure 5-7) graphically show combat condition G-limits for the airplane with no external stores.

No External Stores or Empty Pylons.

Acceleration limitations for the airplane with no external stores or with empty pylons are as follows:

TAKEOFF CONDITION
(Internal fuel exceeds 5500 lb)

Symmetrical pull-outs	6.0 G
Symmetrical push-downs	-2.0 G
Unsymmetrical pull-outs	4.0 G
Unsymmetrical push-downs	0 G

COMBAT CONDITION
(Internal fuel less than 5500 lb)

Symmetrical pull-outs	7.33 G
Symmetrical push-downs	-3.0 G
Unsymmetrical pull-outs	4.8 G
Unsymmetrical push-downs	0 G

NOTE

To insure correct interpretation of acceleration limits, the following definitions apply:

- Symmetrical applies where the airplane bank angle is constant (no roll). Therefore, the airplane may be in other than a wings-level attitude but must not be rolling during the period of accelerated flight.
- Unsymmetrical applies where the airplane is rolling during the period of accelerated flight.

With External Stores.

Acceleration limits for individual external stores are presented in figure 5-6. Where an external loading configuration includes more than one type of store, the over-all configuration G-limit is that for the store with the lowest limit. As stores are released, the over-all configuration limit then becomes that for the lowest limit store remaining in the configuration. There are a few qualifying notes and footnotes which affect the interpretation of the basic G-limits for each individual store. These notes and footnotes must be carefully reviewed for their effect on the over-all loading configuration limit.

EXTERNAL STORE RELEASE LIMITS.

Limitations which must be observed when releasing external stores are given in figure 5-5.

WARNING

Release of an asymmetrically loaded TER (i.e., a TER with only one store on one side rack) is not recommended, because the TER and store may tumble and hit the airplane. However, in extreme emergencies which require jettisoning of all external stores, the asymmetrically loaded TER should be released. Because of the proximity to the speed brake of the inboard rack of the TER when installed at the inboard wing station, the speed brake must be closed when stores are to be released from the TER inboard racks; otherwise, the stores probably would hit the speed brake.

- 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.

MAXIMUM ALLOWABLE STORE LOADING ASYMMETRY.

Store loading asymmetry can be either or both of two conditions:

1. The first condition is where the total number of stores on one wing differs from that on the other wing.
2. The second condition is where stores of different weight and/or drag are loaded on the two wings.

Considering only practical training and tactical external loading configurations, certain limitations must be imposed on the allowable store loading asymmetry. If these limitations are exceeded, unacceptable lateral-directional trim changes could occur. If the asymmetry were to become great enough, there would be insufficient rudder or aileron available for maintaining adequate control of the airplane. In addition, if the airplane were to be trimmed for a certain flight condition and external loading configuration, a sudden change in loading configuration (due to release of one or more external stores) would result in large, dangerous excursions about the airplane's three axes. If the excursions were large enough, structural failure or complete loss of control would occur. There

F-100D AND F-100F ACCELERATION LIMITATIONS

NOTE

Positive unsymmetrical limits are two-thirds of the positive symmetrical limits.
Negative unsymmetrical limit is 0 G.

- Maximum allowable G-limit for a given configuration is the lowest limit listed for the individual stores carried in that configuration.

STORE	SYMMETRICAL G-LIMITS NOTE	STORE	SYMMETRICAL G-LIMITS NOTE
A/A37U-15 Tow Target System	Target Stowed: 1.5 and 0 Target Launched: 2.5 and 0	CBU-53/B Cluster Dispenser	5.0 and -2.0
AIM-9B/E/J Missile	7.0+ and -3.0	CBU-54/B Cluster Dispenser	5.0 and -2.0
B-37K-1 Practice Bomb Rack - With or Without Bombs	6.0+ and -2.0	CBU-58/B, A/B, -71/B, A/B Dispensers	5.0 and -2.0
BLU-1/B, A/B, B/B, and C/B Fire Bomb	6.0+ and -2.0	KMU-342/B Bomb	6.0+ and -2.0
BLU-27/B, B/B, C/B Bomb	6.0+ and -2.0	LAU-3/A Rocket Launcher	4.0 and -2.0
BLU-32A/B, B/B, C/B Fire Bomb	6.0+ and -2.0	LAU-32A/A Rocket Launcher	4.0 and -2.0
BLU-52/B Chemical Bomb	6.0+ and -2.0	LAU-32B/A Rocket Launcher	4.0 and -2.0
CBU-1A/A Dispenser	6.0+ and -2.0	LAU-59/A Rocket Launcher	4.0 and -2.0
CBU-2A/A, B/A and C/A Dispenser	6.0+ and -2.0	LAU-68A/A Rocket Launcher	5.0 and -2.0
CBU-3A/A Dispenser	6.0+ and -2.0		
CBU-7/A Dispenser	6.0+ and -2.0		
CBU-9A/A, B/A Dispenser	6.0+ and -2.0	M117 GP Bomb	6.0+ and -2.0
CBU-12/A, A/A Cluster Dispenser	6.0+ and -2.0	M117 GP Bomb with MAU 103 A/B Fin	6.0+ and -2.0
CBU-24/B, A/B and B/B Cluster Dispenser	5.0 and -2.0	M117(R) Bomb	6.0+ and -2.0
CBU-28/A Bomblet Dispenser	6.0+ and -2.0	M117(D) Bomb	6.0+ and -2.0
CBU-29/B, A/B and B/B Cluster Dispenser	5.0 and -2.0	M117 GP Bomb with .36 inch Fuse Extender	6.0+ and -2.0
CBU-30/A Dispenser	6.0+ and -2.0	M129E1 Leaflet Bomb	6.0+ and -2.0
CBU-34/A, CBU-34A/A Mine Dispenser	4.0 and -2.0	MC-1 Chemical Bomb	6.0+ and -2.0
CBU-37/A Mine Dispenser	6.0+ and -2.0	MK-12 Mod 0 Leaflet Tank	6.0+ and -2.0
CBU-42/A Mine Dispenser	4.0 and -2.0	MK-20	6.0+ and -2.0
CBU-46/A Bomb Dispenser	6.0+ and -2.0	MK-36 Mod Destructor	6.0+ and -2.0
CBU-49/B, A/B and B/B Cluster Dispenser	5.0 and -2.0	MK-81 GP Bomb	6.0+ and -2.0
CBU-52B/B, Dispenser	5.0 and -2.0	MK-82 GP Bomb	6.0+ and -2.0

Figure 5-6 (Sheet 1 of 2)

F-100D AND F-100F ACCELERATION LIMITATIONS

STORE	SYMMETRICAL G-LIMITS NOTE	STORE	SYMMETRICAL G-LIMITS NOTE
MK-82 GP Bomb with MIAI 36 inch Fuse Extender	6.0† and -2.0	SUU-25B/A Flare Launcher	6.0† and 2.0
MK-82 Snakeye I Bomb	6.0† and -2.0	SUU-25C/A, E/A	6.0† and 2.0
MK-83 GP Bomb	6.0† and -2.0	Type II 450-gallon Fuel Tank	With Fuel: 4.0 and -2.0 Empty: 5.0 and -2.0
AN/ALQ-() ECM Pod	6.0† and -2.0	Type III NAA 335-gallon Fuel Tank	With Fuel: 4.5 and -2.0 Empty: 6.0 and -2.0
SUU-20() Practice Dispens- ers (Full or Empty)	5.0 and -2.0	Type III NAA 275-gallon Fuel Tank	With Fuel: 5.0 and 2.0 Empty: 6.0 and 2.0
SUU-21/A Practice Dispenser (Full or Empty)	6.0 and -2.0	Type II 275-gallon Fuel Tank	With or Without Fuel: 4.0 and 2.0
SUU-26A/A, Flare Launcher (Full or Empty)	4.0 and -1.0	Type IV 200-gallon Fuel Tank Fuel Tank	With or Without Fuel: 4.0 and 2.0

* Limits are 6.0 and -2.0 when internal fuel is more than 4200 pounds.

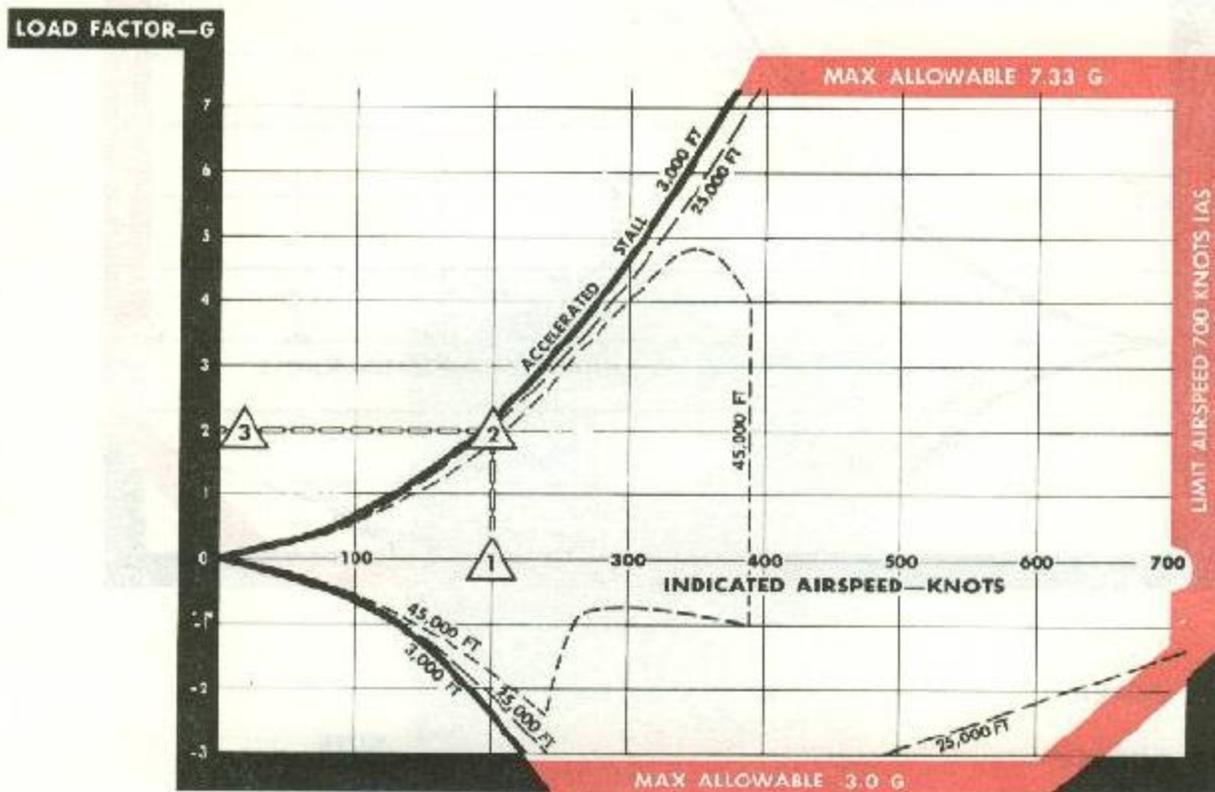
† Limit is 5.0 G when overall configuration is asymmetrical, whenever store is carried at the centerline station, or whenever internal fuel is more than 4200 pounds.

Figure 5-6 (Sheet 2 of 2)

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.

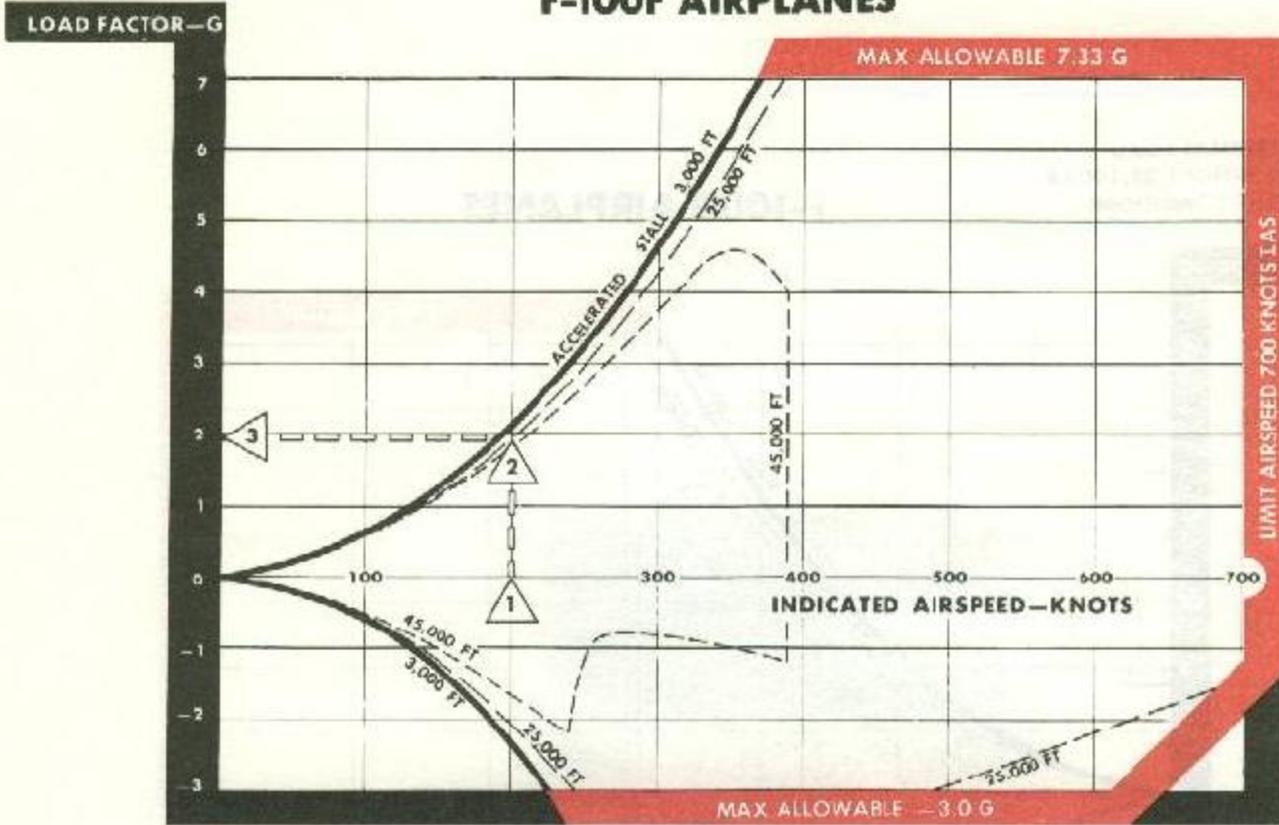
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Figure 5-7 (Sheet 1 of 2)

LIMITS

NO EXTERNAL LOAD:
GROSS WEIGHT 28,700 LB
(COMBAT CONDITION)

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.

Figure 5-7 (Sheet 2 of 2)

the following three limitations pertaining to store loading asymmetry must be observed:

1. Asymmetry in the total number of stores per wing must not exceed one.
2. Asymmetry in location of stores per wing must not exceed one.
3. Asymmetry in types and weights of stores per wing must not exceed one.

NOTE

For limit 3, failure of one drop tank of a symmetrically mounted pair of drop tanks to feed must be considered an asymmetrical condition.

These are limits deemed practical for the pilot to observe and to be compatible with all mission requirements for the airplane. It is unnecessary to allow any more flexibility in store loading asymmetry, because to do so would impose an unwarranted burden on the pilot. In fact, if the ultimate limits in asymmetry which the airplane could tolerate and still be flown safely were to be presented, they would be of such complexity that they could not be put to practical use. The three limits given previously will permit takeoff and flight with asymmetrical configurations which are frequently necessary in training and combat. They consider the possibility of a single failure or a single pilot error. Multiple failures and multiple pilot errors, or combinations of both, cannot be considered in the limits imposed. The following table graphically illustrates some acceptable and unacceptable asymmetrical external loading configurations, as an aid in interpreting the stated limits:

ACCEPTABLE STORE LOADING ASYMMETRY					
OUTBOARD	INTERMEDIATE	INBOARD	INBOARD	INTERMEDIATE	OUTBOARD
X					
X				Y	
	Y		Z		
X	Y			Y	
X	Y				X
X	Y		Z		X
	Y	Z	Z		
	Y	Z		Y	
UNACCEPTABLE STORE LOADING ASYMMETRY					
OUTBOARD	INTERMEDIATE	INBOARD	INBOARD	INTERMEDIATE	OUTBOARD
2,3 X			Z	Y	
2,3	Y		Z		X
2,3		Z		Y	X
1,2,3 X	Y	Z	Z		
1,2,3 X	Y	Z		Y	
1,2,3 X	Y	Z			X
1,2,3	Y	Z			
NOTE					
The letters under the station column headings symbolize specific stores.					
● A store carried at the centerline station is not asymmetrically mounted and may be ignored in determining maximum allowable asymmetry.					
● Numbers to the left of the unacceptable configuration listings indicate the limits which are exceeded.					
● If a limiting asymmetrical loading condition is reached inadvertently, it must be corrected before additional stores are released or dispensed which would further increase the asymmetry.					

SAMPLE PROBLEMS.

The following sample problems are for F-100D Airplanes but are in general applicable to F-100F Airplanes. Where certain information is not applicable to F-100F Airplanes, it is noted. In addition, the sample problems show only how to determine acceptability of an external loading configuration as it relates to the maximum allowable index sum and the sum of store indices. Maximum allowable airspeeds and release limits for external stores are not covered in these sample problems, since such information is adequately covered elsewhere in this section.

Sample Problem No. 1.

The clean airplane CG is 30.0 percent MAC. Examination of figure 5-3 shows a maximum allowable index sum of 68.

Mission requirements call for delivery of MK-82 Snakeye I bombs and carriage of two 335-gallon drop tanks. Ammunition will be fired during target run-in.

From figure 5-5, the following store indices are determined:

INBOARD STORES CARRIED ON PYLONS		
STORES	STATION	INDEX NUMBER
Two MK-82 Snakeye I bombs	Inboard	-11
Two 335-gallon drop tanks	Intermediate	42
Two MK-82 Snakeye I bombs	Outboard	29
Total of store indices		60
Maximum allowable index sum		68

INBOARD STORES CARRIED ON TER'S		
STORES	STATION	INDEX NUMBER
Six MK-82 Snakeye I bombs	Inboard	-32
Two 335-gallon drop tanks	Intermediate	42
Two MK-82 Snakeye I bombs	Outboard	29
Total of store indices		39
Maximum allowable index sum		68

In both of the preceding cases, the total of all store indices is less than the maximum allowable, so the configurations can be safely flown. Normal release sequence for ordnance stores for these configurations is outboard, then inboard. However, for the purpose of illustrating the safe control the index system provides, it is considered that release of the inboard stores first is desired. Release of all inboard stores first in both cases would result in a store index of 42 for the drop tanks plus 29 for the outboard stores, for a total of 71, which is greater than the maximum allowable index sum of 68. Therefore, in both cases, the outboard stores must be released before the inboard stores are released.

Sample Problem No. 2

The airplane is to be loaded with 335-gallon drop tanks, CBU-2A/A dispensers, and unfinned BLU-27/B fire bombs. Exact nature of the target layout for most effective store release sequence is not known before takeoff. It is assumed that ammunition will be fired during target run-in before any stores will be released or dispensed. From figure 5-5, the following store indices are determined (assume the inboard stores are carried on pylons, not TER's):

STORES	STATION	INDEX NUMBER
Two unfinned BLU-27/B fire bombs	Inboard	-16
Two 335-gallon drop tanks	Intermediate	42
Two CBU-2A/A dispensers	Outboard	38 (full) 17 (empty)
Total of store indices		64 (dispensers full) 43 (dispensers empty)

CONDITION NO. 1. For a clean airplane CG of 30.0 percent MAC, the maximum allowable index sum is 68. The total of all stores indices, dispensers full or empty, is less than the maximum allowable sum. Therefore, the configuration is acceptable, and ammunition may be fired as required — during target run-in. The desired drop sequence is not known before takeoff, so the possibility of releasing inboard stores first must be reviewed. If the inboard stores

are released first, the index sum for stores remaining would be 42 for the drop tanks and 38 for the full dispensers, for a total of 80. Therefore, the standard sequence for use of stores must be observed; namely, outboard, then inboard.

Separate calculations are required when dispenser-type stores are carried, as in this example No. 2. With the outboard dispensers emptied and intermediate and inboard stores retained, the store indices would be 17 for the empty dispensers, 42 for the drop tanks, and -16 for the fire bombs, for a total of 43. This is within the maximum allowable index sum of 68. Now, release of the inboard stores, with the drop tanks and empty dispensers retained, would result in store indices of 17 for the empty dispensers and 42 for the drop tanks, for a total of 59. This also is within the maximum allowable index sum of 68. If the index total for the empty dispensers and the drop tanks had exceeded the maximum allowable index sum, it would have been necessary to modify store usage. In such an instance, the dispensers could have been jettisoned before the inboard stores were released, or a smaller drop tank index number could have been used. (Use of the smaller drop tank index number is explained in condition No. 2.)

CONDITION NO. 2. Assume the clean airplane CG is 30.5 percent MAC. For this CG, the maximum allowable index sum is 63. The store loading configuration for condition No. 1 has an index total of 68, or 5 greater than the maximum allowable index sum. This indicates the configuration is not acceptable for the 30.5 percent MAC airplane unless certain restrictions can be complied with. When 335-gallon drop tanks are carried, the tank index may be reduced for F-100D Airplanes only, provided ammunition is not fired until the outboard stores are released or expended. This reduction capability is covered in figure 5-5. The drop tank index then can be reduced by 9, to 33, or by the difference between the full and empty dispenser index numbers (38, -17, or 21), whichever is less. Decreasing the drop tank index by 9, the lesser of the two numbers, results in an index sum of 54. The configuration then can be flown with the restriction indicated.

Sample Problem No. 3.

When external stores are to be carried that may be installed at several stations, desired sequence of usage will be a prime condition in determining where the various stores are installed. Another consideration would be the relative index values.

The index for BLU-27 unfinned fire bombs at the outboard stations is 38. The index for unfinned BLU-1/B fire bombs also at the same stations is 34. However, the indices for these same stores at the inboard stations are -16 for the BLU-27 bombs and -11 for the BLU-1/B fire bombs. Therefore, some loadings might be unacceptable with one type of stores outboard but acceptable by transposing the outboard and inboard station stores. For example, for an airplane with a clean airplane CG of 30.6 percent MAC, the maximum allowable index sum is 62. With BLU-27 bombs outboard, 335-gallon drop tanks intermediate, and BLU-1/B bombs inboard, the index total is 69, which exceeds the 62 maximum allowable. However, with BLU-1/B bombs outboard, 335-gallon drop tanks intermediate, and BLU-27 bombs inboard, the index total is 60, which does not exceed the maximum allowable. Either of these index totals could be reduced, if necessary, by restricting firing of ammunition, as explained in condition No. 2 of sample problem No. 2.

CENTER-OF-GRAVITY LIMITATIONS.

The store index system described under External Store Index System in this section incorporates the controls necessary to maintain the airplane center of gravity within limits, provided other restrictions and limitations covered in this section are observed.

NOTE

Aircraft modified by T.O. 1F-100-977F, 992, 994, 1031, or T.O. 1F-100F-566 could move the center of gravity forward of its clean takeoff aerodynamic limits, between 25.5 and 26.0 percent MAC. These aircraft may be flown but the touchdown speed should be increased 5 knots (above the speeds recommended in T.O. 1F-100A-1-1).

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:

1. Drop tank fuel must be sequenced outboard, inboard, then intermediate.

2. If a full 200-gallon drop tank is carried at an outboard station and fails to transfer fuel, it must be released before fuel from inboard 200-gallon drop tanks, if installed, is transferred.

3. Unbaffled 450-gallon drop tanks must be full or empty before engine start. If these tanks are full, do not select fuel from these tanks until initial climb schedule is established. Transfer of fuel from any other type tank may be initiated when desired, just so the sequence outlined in the preceding restriction is followed.

4. 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.

LANDING LIMITATIONS.

LANDING WITH ONLY INBOARD STORES.

If landings must be made with stores at the inboard station or stations only, the touchdown speed must be increased above the recommended speed in order to ensure adequate longitudinal control through the flare and touchdown. The touchdown speed increase required for both the F-100D and F-100F Airplanes is as follows:

1. For F-100D Airplanes, increase touchdown speed 5 knots IAS for each 1000 pounds of total inboard store weight in excess of 1500 pounds.

2. For F-100F Airplanes, increase touchdown speed 5 knots IAS for each 1000 pounds of total inboard store weight.

LANDING WITH CONVENTIONAL ORDNANCE.

Following any attempted release or jettison, any conventional ordnance that does not separate from the airplane should be considered armed and susceptible to inadvertent

release during landing impact. Following a normal release or firing, all bomb dispensers and rocket launchers should be considered as still containing one or more bombs or rockets. If visual examination cannot positively confirm a safe condition, the affected dispensers or launchers must be jettisoned before landing.

NOTE

The preceding instruction does not apply to SUU-25 flare launchers; LAU-32A/A, LAU-32B/A, and LAU-59/A rocket launchers; all rockets with inert warheads used for training; and training devices that require jettisoning of the pylon/training device assembly.

WEIGHT LIMITATIONS.

MAXIMUM ALLOWABLE GROSS WEIGHT.

The maximum allowable gross weight for F-100D and F-100F Airplanes is 41,500 pounds.

NOTE

Maximum allowable gross weight is defined as the weight of the clean airplane (readied for flight) plus the weight of all external stores and pylons as computed for the airplane before engine start.

- There is no maximum landing weight; consequently, it is not necessary to burn out fuel before landing.

To prevent exceeding structural limits, the following store loading restrictions must be observed:

1. When a store is carried at the centerline station and 335- or 275-gallon drop tanks containing fuel are also carried, total weight of stores carried at the outboard stations must not exceed 1000 pounds.

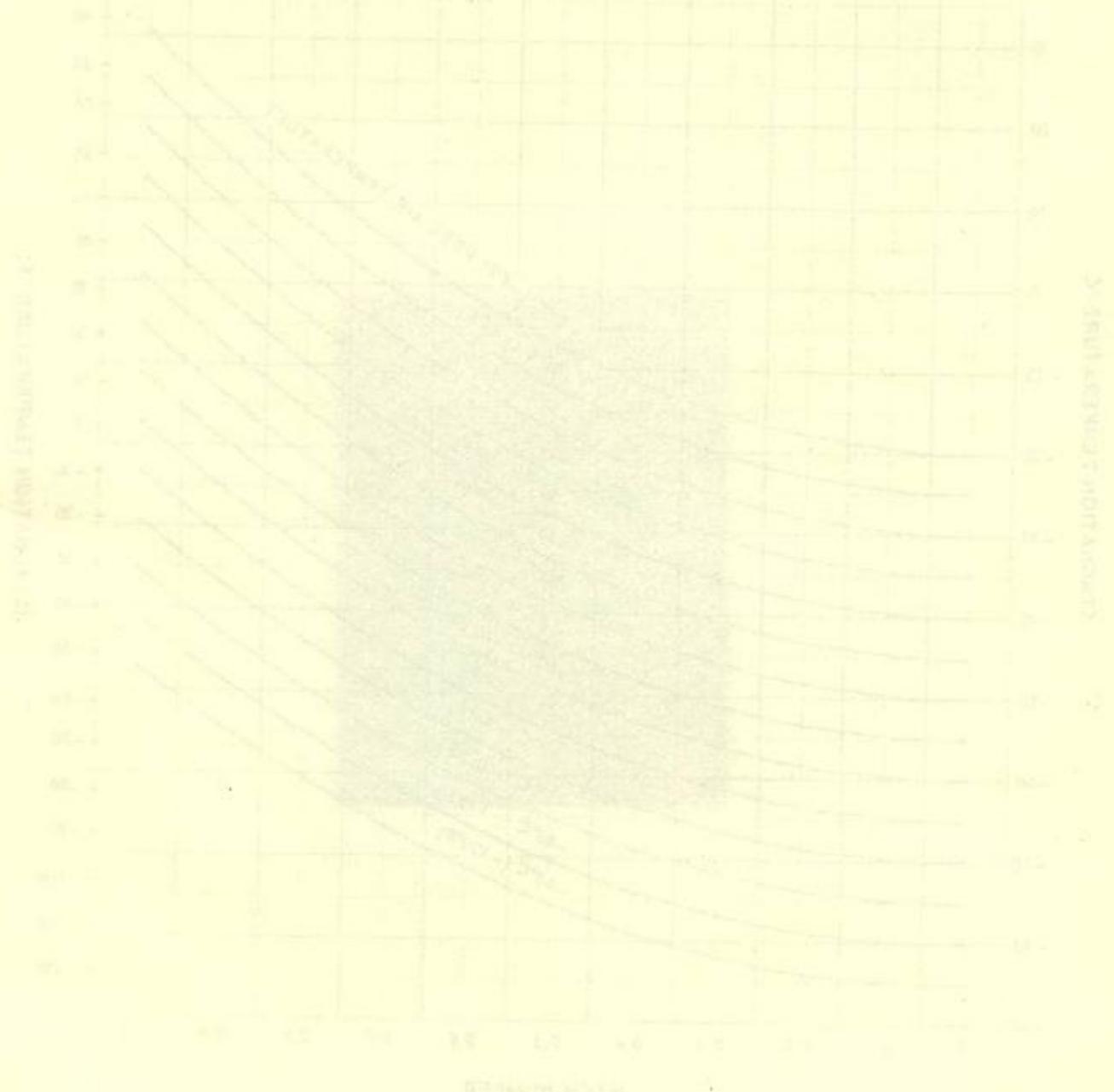
2. When a store is carried at the centerline station and 450-gallon drop tanks containing fuel also are carried, total weight of stores carried at the outboard stations must not exceed 350 pounds.

3. When 450-gallon drop tanks containing fuel are carried in conjunction with stores at the outboard stations whose total weight exceeds 1000 pounds, stores of equivalent or greater total weight must be carried at the inboard stations.

Determination of an individual airplane's gross weight is accomplished by adding the weight of all external stores and pylons being carried to the clean airplane weight. The clean airplane weight is obtained from DD Form 365F. Store and pylon weights are given on the drag computation

chart in section I of T.O. 1F-100C(I)-1-1. Pylon capabilities for the various stations are:

STATION	PYLON CAPABILITY
Centerline	Series VII
Inboard	Series I or Series IX
Intermediate	Series III or Series VIII
Outboard	Series III



MACH NUMBER
VS
STAGNATION TEMPERATURE

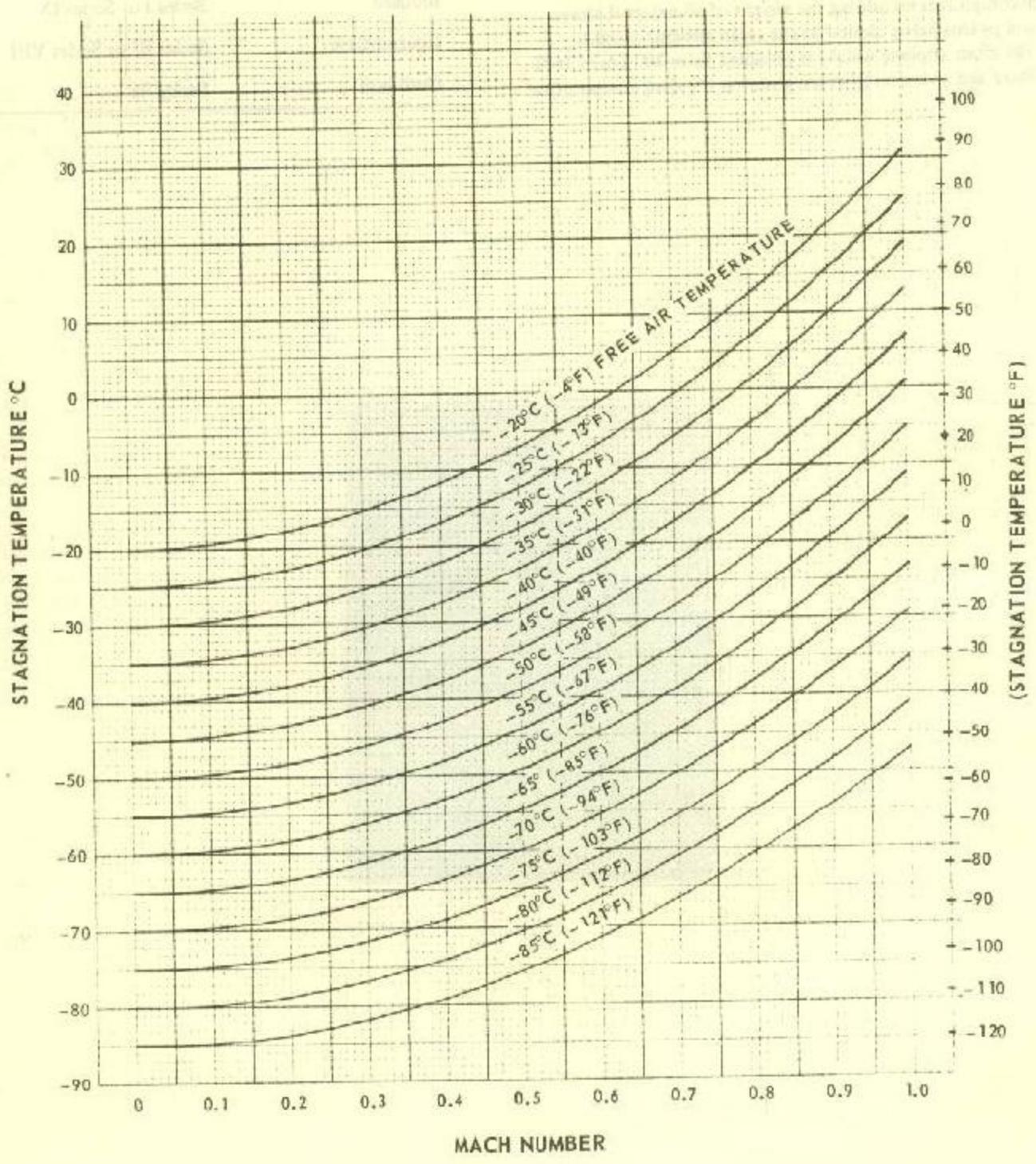


Figure 5-8

FLIGHT CHARACTERISTICS



F-100D-14-84

section

VI

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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, adverse yaw may be encountered at high angles of attack.

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-100C(I)-1-1.

MACH NUMBER CHART

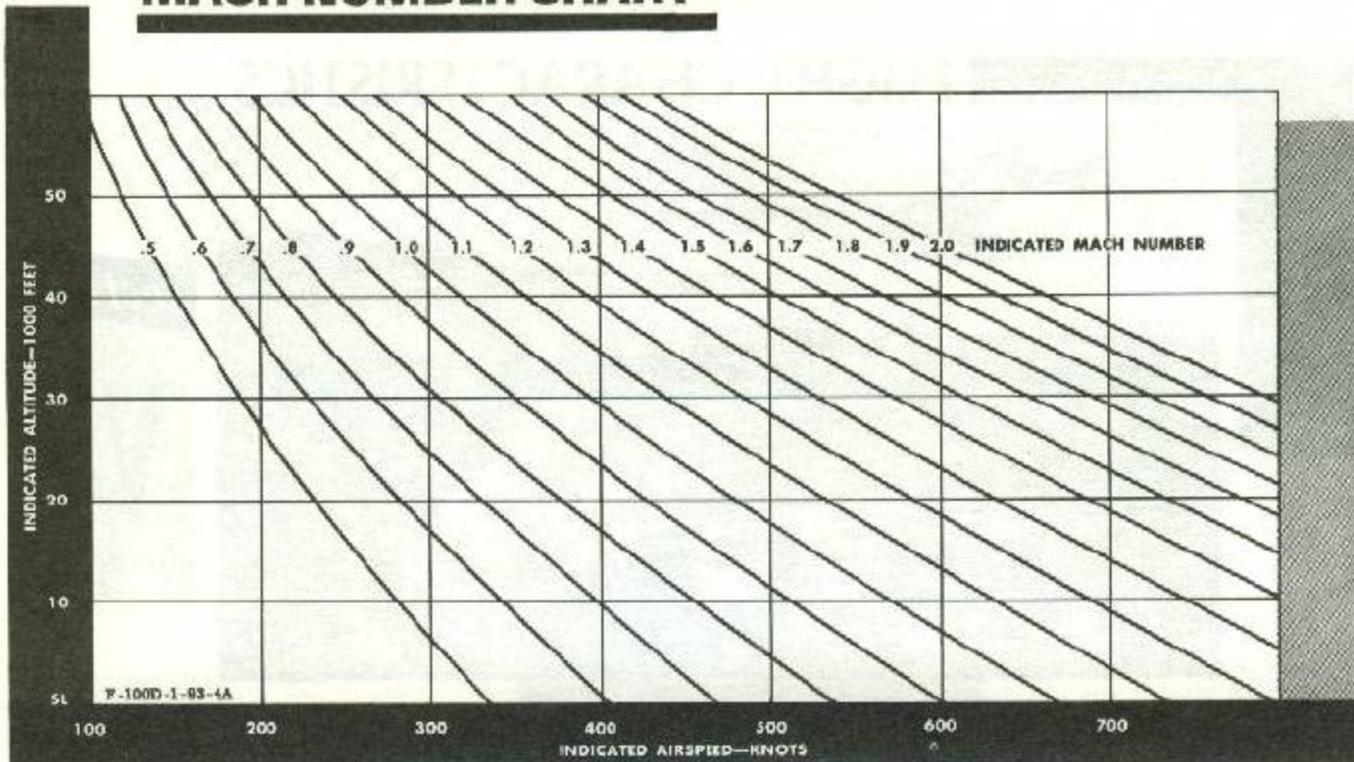


Figure 6-1

NOTE

The airspeed/Mach 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.

This airplane, with its highly swept-back wings, does 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 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

MINIMUM CONTROL AND STALL SPEEDS, GEAR AND FLAPS DOWN . . . KNOTS IAS

		ANGLE OF BANK				
		0°	30°	45°	60°	
		LOAD FACTOR				
		1.0 G	1.2 G	1.4 G	2.0 G	
POWER OFF	MINIMUM CONTROL SPEEDS ARE SHOWN IN BOLDFACE STALL SPEEDS ARE SHOWN IN PARENTHESES	GROSS WT.-LB				
		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)		GROSS WT.-LB				
		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-1-03-86B

Figure 6-2

not touch down at speeds below the recommended minimum for a particular gross weight. (Refer to T.O. 1F-100C(I)-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 two-fold. 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.

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. If a severe accelerated stall accompanied by a "roll-off" is encountered at a critical altitude, or loss of control occurs during maneuvering flight at heavy gross weights, jettison of external loads is recommended to enhance recovery.

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 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 Immelmans 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. Force 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.

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 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 flameout 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.

Refer to Spin Recovery in section III. 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 TAKEOFF" 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.

TYPICAL SPIN CHARACTERISTICS

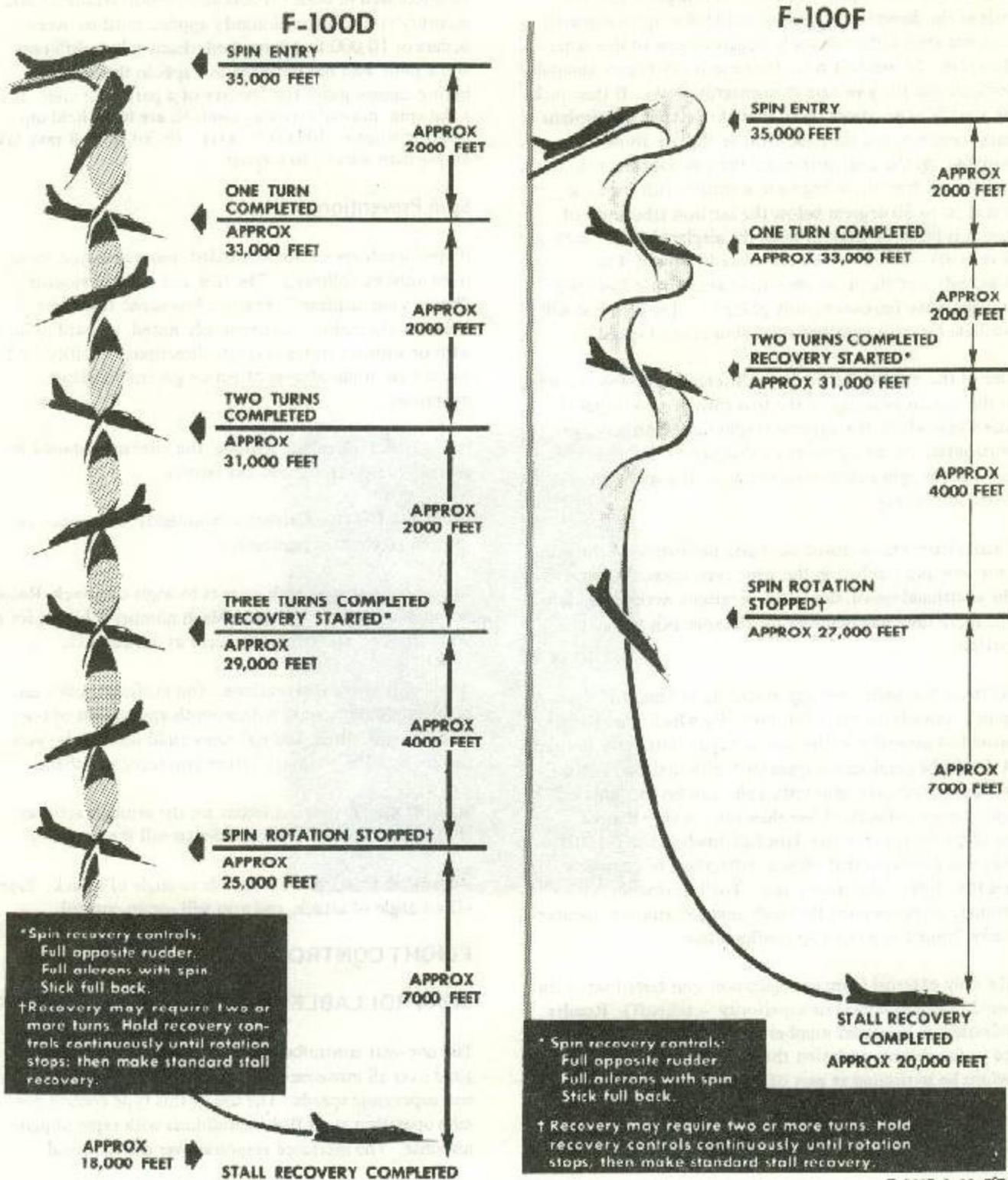


Figure 6-3

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-spins" 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 - takeoff). 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. If in a flat spin, normal recovery controls are to be held until rotation stops or 10,000 ft. AGL. In flat spins it may take longer than normal to recover.

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 quantities.

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 rudder to roll the airplane.

Remember the airplane responds to angle of attack. Ease off on angle of attack, and you will regain control.

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 of rudder in the same direction as the turn should be followed; whereas, in the transonic 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 takeoff, approach, and landing phases of flight are given in T.O. 1F-100C(I)-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 descent; 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-100C(I)-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.

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.

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 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.

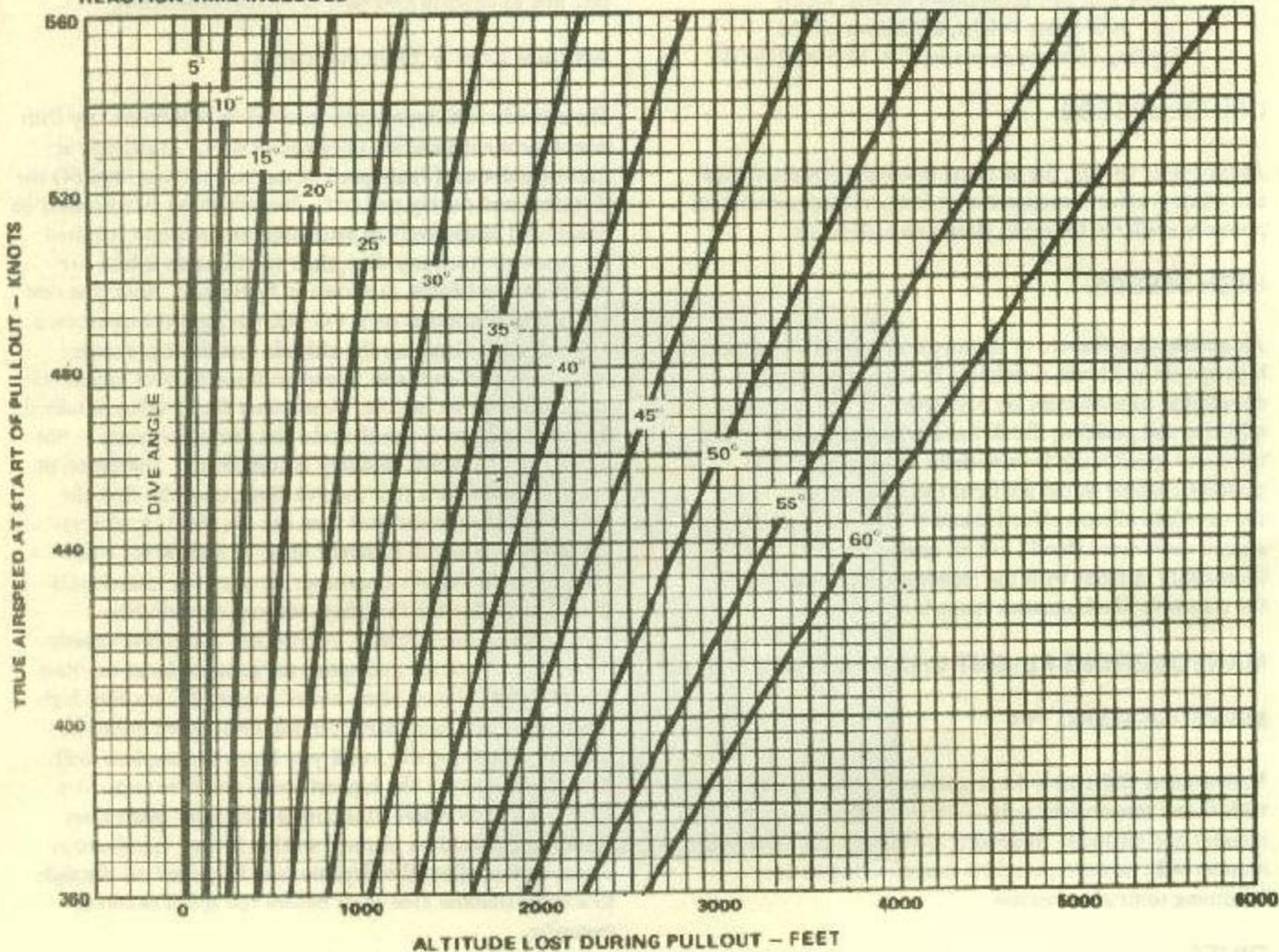
ROLLING PULL-OUT.

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

ALTITUDE LOSS IN

ATTAINED IN 2.0 SECONDS
NO OTHER SAFETY FACTORS OR
REACTION TIME INCLUDED

CONSTANT **4G** PULLOUT



NOTE

Release altitude must always be greater than the sum of altitude lost during pullout and minimum recovery altitude above the ground. This chart contains no reaction time or safety factors (other than the 4.0G attained in 2 seconds).

DIVE RECOVERY CHART

The dive recovery chart may be used to determine the altitude lost during pullout. The data on this chart was taken from recovery flight path computations based on the F-100D thrust, drag, and angle-of-attack information. In these computations, the acceleration was built up linearly from the cosine of the initial dive angle to the planned 4.0 G pullout acceleration. A 2 second G-buildup time was used commencing immediately after release or firing. No throttle advance was assumed until the nose of the airplane passed through the horizon. Enter the chart with release velocity (KTAS). Project to the right to release dive angle, and down to altitude lost.

Figure 6-4 (Sheet 1 of 2)

DIVE RECOVERY

6G
CONSTANT PULL-OUT

ATTAINED IN 2.0 SECONDS
NO OTHER SAFETY FACTORS OR
REACTION TIME INCLUDED

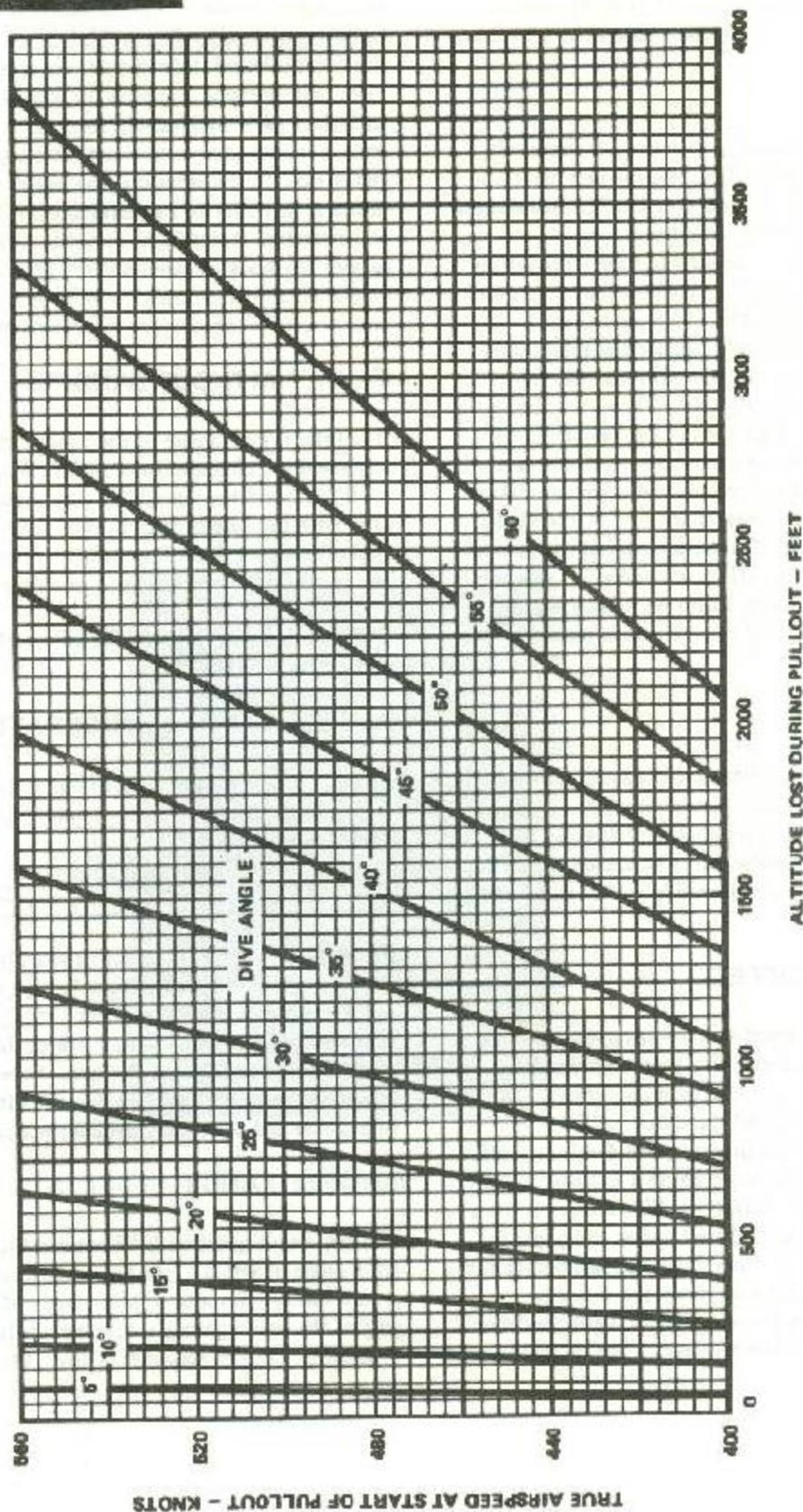


Figure 6-4 (Sheet 2 of 2)

DIVE RECOVERY CHART

The dive recovery chart may be used to determine the altitude lost during pullout. The data on this chart was taken from recovery flight path computations based on the F-100D thrust, drag, and angle-of-attack information. In these computations, the acceleration was built up linearly from the cosine of the initial dive angle to the planned 5.0 G pullout acceleration. A 2 second G-buildup time was used commencing immediately after release or firing. No throttle advance was assumed until the nose of the airplane passed through the horizon. Enter the chart with release velocity (KTAS). Project to the right to release dive angle, and down to altitude lost.

NOTE

Release altitude must always be greater than the sum of altitude lost during pullout and minimum recovery altitude above the ground. This chart contains no reaction time or safety factors (other than the 6.0 G attained in 2 seconds).

pull-out at supersonic speeds 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.

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.

SHOCK-INDUCED BUFFET.

Airplane buffet is encountered at transonic speeds at high altitude. This buffet is induced by a span-wise 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 blocking the two outboard slat segments on each wing panel 2 degrees open, and on some airplanes, by a wing fence on the upper surface of each wing panel. 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 airplane 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 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 high 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.

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 of 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 4 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, 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 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 down-going 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 airplanes, 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

REGIONS OF BUFFET AND EFFECTS ON MANEUVERABILITY

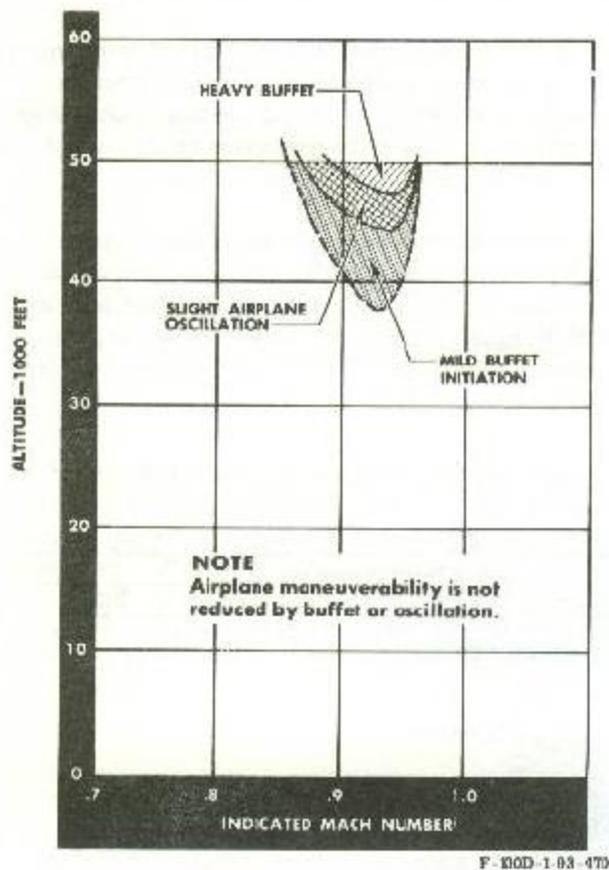
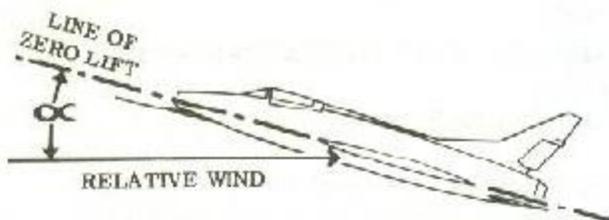


Figure 6-5

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 180 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 LB AT 4 "G"'S IS ALSO APPROXIMATELY 15 DEGREES

Figure 6-6

LIFT VS ANGLE OF ATTACK

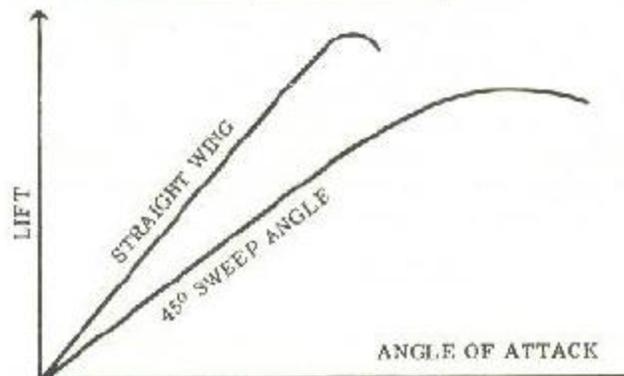


Figure 6-7

F-100-1-03-517

INDICATED AIR SPEED AND G EFFECTS

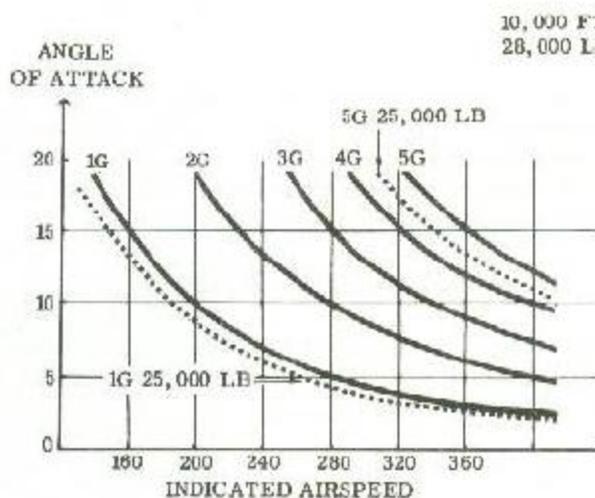


Figure 6-8

F-100-1-03-578

LATERAL-DIRECTIONAL CONTROL RESPONSE

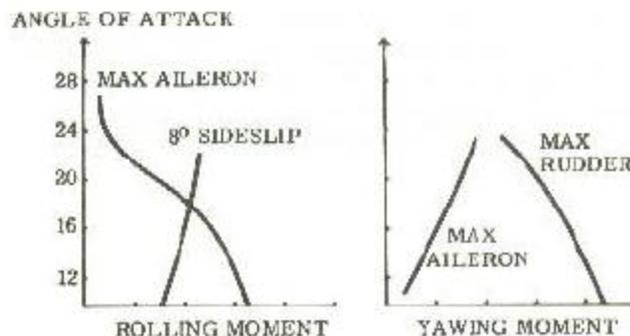


Figure 6-9

F-100-1-03-579

DIHEDRAL EFFECT (ROLL DUE TO SIDESLIP)

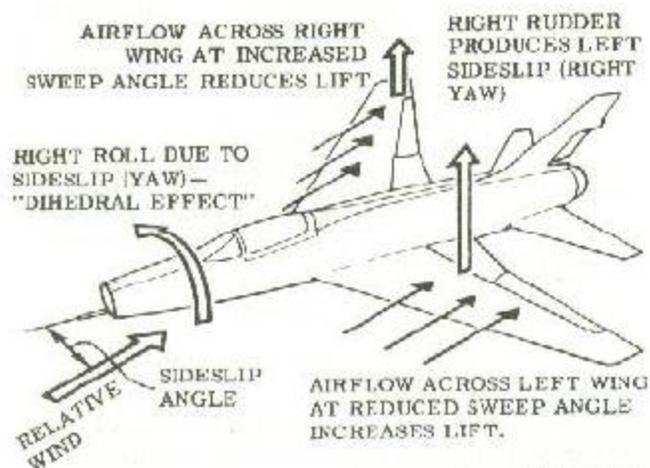


Figure 6-10

ADVERSE YAW-SHOWING DIFFERENTIAL DRAG ONAILERONS

CONDITIONS:

- NO EXTERNAL STORES
- RIGHT ROLL
- LEFT YAW (ADVERSE)



Figure 6-11

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 airplane 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.

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

ASYMMETRIC CONFIGURATION (TRIMMED FOR LEVEL FLIGHT)



F-100-1-50-222

Figure 6-12

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 takeoff 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.

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, takeoff speeds naturally are high, and the airplane handles somewhat sluggishly immediately after takeoff. 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 configuration 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 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.

TAKEOFF. At start of takeoff 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, to establish a pitch change of 8° to 10° . 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 takeoff speed. Be prepared to correct for a possible yawing tendency as the airplane becomes airborne. Do not pull the airplane off, because 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 takeoff. If it is used, set left aileron so that its trailing edge is about 3/4 inch below the wing trailing edge.

Instrument takeoff with asymmetrical loading configurations is not recommended. Directional control during takeoff and initial climb is critical. If such a takeoff must be made, the airplane should be trimmed out after takeoff 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, 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 required.

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-100C(I)-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 that develop from approved loadings 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 takeoff 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-100C(I)-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 takeoff CG location.

1. 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-100C(I)-1-1 for gross weight involved. This increase in touchdown speed will ensure adequate longitudinal control.

2. For airplanes with a clean airplane takeoff center of gravity between 29 to 30 percent MAC, the touchdown speeds recommended in T.O. 1F-100C(I)-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 takeoff 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 control problems. Heavy stores (500 pounds or 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 5 knots IAS for each 1000 pounds of total inboard store weight.

NOTE

Aircraft modified by T.O. 1F-100-977P, 992, 994, 1031, or T.O. 1F-100F-566 could move the center of gravity forward of its clean takeoff aerodynamic limits, between 25.5 and 26.0 percent MAC. These aircraft may be flown, but the touchdown speed should be increased 5 knots (above the speeds recommended in T.O. 1F-100C(I)-1-1).

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:

1. Rockets or bombs other than 25-pound bombs at the outboard stations and empty drop tanks inboard.
2. Rockets or bombs heavier than 500 pounds at the outboard stations only.
3. 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 speed presented in T.O. 1F-100C(I)-1-1. For configuration 1., where empty drop tanks are carried inboard, dropping the tanks will increase both the longitudinal and directional stability and thus provide improved handling and characteristics.

For the F-100F Airplane, the center of gravity will not exceed any aft stability limit for abnormal 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

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

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 additional increment for experience level should be added to approach speeds for abnormal asymmetrical loading configuration when the flat, straight-in approach is used.

† 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.

Figure 6-13

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-100C(I)-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-100C(I)-1-1 approach speeds required to provide adequate lateral control through touchdown when following the approach and touchdown procedures recommended in paragraphs 1. and 2. 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.

1. 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

LONGITUDINAL CONTROL PROBLEMS

F-100D AIRPLANES

WITH ABNORMAL ASYMMETRICAL LOADING CONFIGURATIONS

CONFIGURATION	RECOMMENDED ACTION
<p>The figure contains two diagrams of an F-100D airplane from a top-down perspective, illustrating abnormal asymmetrical loading configurations. The top diagram shows a full 335-or-275-gallon tank on the left wing, an empty 200-gallon tank in the center fuselage, a special store on the right wing, and a full 200-gallon tank on the far right wing. The bottom diagram shows a full 335-or-275-gallon tank on the left wing, two empty 200-gallon tanks in the center fuselage, a special store on the right wing, and a full 200-gallon tank on the far right wing.</p>	<p>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 335-or-275-gallon tank as a lateral control problem will result. If a 335-or-275-gallon tank is carried in place of the special store, empty both 335-or-275-gallon tanks. Dropping these tanks will provide a further improvement in handling characteristics.</p>

Figure 6-14

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.

2. It should be emphasized that any substantial increase in touchdown speed over that recommended in T.O. 1F-100C(I)-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.

TER CARRIAGE CHARACTERISTICS.

The TER capability on F-100D airplanes essentially magnifies the deterioration in flight characteristics when carrying external stores, compared to those for airplanes without TER's installed. This is due to the greater total store drag and higher gross weights possible with the TER capability. The higher drag significantly affects airplane forward acceleration capability. In addition, with loaded TER's, an increase in airframe buffet can be expected. The following paragraphs apply to the airplane in heavyweight (or asymmetrical) TER configuration.

1. **TAKEOFF.** Extreme care must be exercised during takeoff roll to rotate the nose at the recommended speed. If the nose of the airplane is rotated below the recommended speed, the additional drag will result in excessive takeoff distance.

NOTE

When taking off with fully loaded TER's considerable backstick pressure is required for nose rotation.

- For external loading configurations which do not include TER loadings, premature nosewheel liftoff definitely will result in excessive takeoff distance. However, the problem is more acute when carrying TER configurations of comparable weight, due to the increased drag and, consequently, the reduction in acceleration capability.

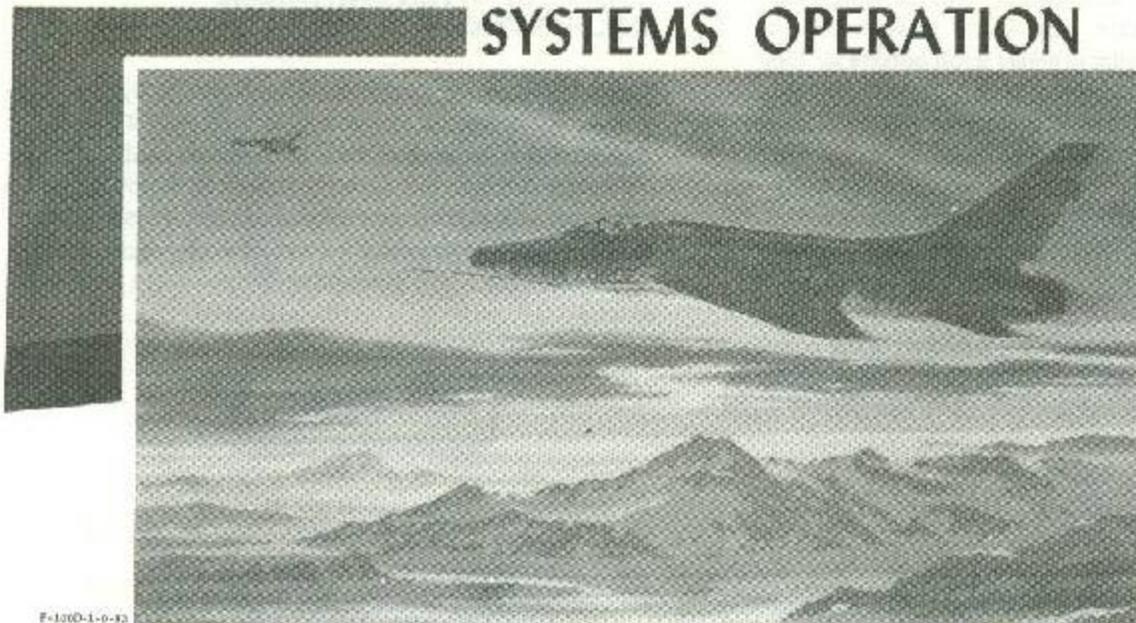
2. **CLIMB.** The higher drag and higher gross weights possible when carrying external loading configurations

which include stores on TER's result in poor climbout performance after takeoff. To obtain normal climb performance, do not raise the wing flaps until an airspeed of 210 to 220 knots IAS is attained. Maximum thrust should be maintained until approximately 300 knots IAS is attained, because of the deterioration in handling qualities.

3. **LANDING.** It is possible with loaded TER's installed to encounter abnormally high drag and landing weights. Under these conditions, the military thrust available for decreasing rate of descent or for performing a go-around may be inadequate. Therefore, when landing with heavy-weight TER configurations, extra caution should be exercised. Use a shallow approach angle and fly the correct approach speed for the airplane gross weight.

4. **ASYMMETRICAL TER LOADING CONFIGURATIONS.** With a loaded TER at one inboard station only, the asymmetric drag is more pronounced than for other approved asymmetric loading configurations, resulting in larger rudder angles required for trim. Rudder trim requirements may become critical if landing in a cross-wind.

SYSTEMS OPERATION



F-100D-1-0-83

section

VII

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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 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 takeoff 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 takeoff, to compensate for temperature. (Refer to Engine Pressure Ratio Gage in section I.) When the engine pre-flight 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 takeoff if the pointer falls within the limits listed under Engine Limitations in section V. Takeoff 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 first 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.

ENGINE STARTER CARTRIDGE MALFUNCTIONS.

Tactical Commanders may waive the 5-minute waiting period. Reducing the 5-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.)

WARNING

The cartridge screen end must not be pointed toward airplane 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 the time interval (as much as 5 minutes) between pressing the start button and the generation of the full 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.

WARNING

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 55 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 55 psi at any power setting or exceeds 55 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 60 psi is tolerable and will not harm the engine, provided there is no substantial oil pressure fluctuation, and provided the stabilized pressure returns to the normal range.

NOTE

Oil pressure will have a tendency to follow the throttle. This condition is normal provided pressure stabilizes between minimum and maximum limits.

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 undesirable 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:

1. 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.

2. During high-altitude, low-air-speed 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.

3. On the ground, mild acceleration stalls will usually be experienced just above idle (60 to 70% rpm). This type of stall is considered acceptable, provided the engine accelerates from IDLE to Military Thrust within 15 seconds.

4. 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.

5. 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.

6. 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:

1. Excessive fuel scheduling by the fuel control unit can cause stalls during engine acceleration.

2. Unsatisfactory operation of the intercompressor bleed valve may result in stalls during engine acceleration or deceleration or steady-state fixed-throttle stalls.

3. 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.

4. If the exhaust nozzle is slow acting or will not open, an extremely violent compressor stall will occur when afterburner is selected.

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 persists, 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 result 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 takeoff 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.

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 flame-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 Thrust climbs are sometimes unsuccessful on the first attempt.

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 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 takeoff 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 be necessary to retrim engines to obtain the full takeoff 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 -51°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-100C(I)-1-1 for fuel specific weight differences.

FUEL SYSTEM MANAGEMENT.

INTERNAL FUEL SEQUENCING.

Sequencing of internal fuel is entirely automatic. Normal fuel sequencing is indicated by the following forward tank/total quantity gage readings:

FUEL TRANSFER SEQUENCE (BASED ON FUEL FLOW OF 4000 POUNDS OR LESS)

	FWD GAGE READS (LB)	TOTAL GAGE SHOULD READ (LB)
Full internal fuel load	2913	7730

FUEL TRANSFER SEQUENCE (Continued) (BASED ON FUEL FLOW OF 4000 POUNDS OR LESS)

	FWD GAGE READS (LB)	TOTAL GAGE SHOULD READ (LB)
Drop tanks start feeding when	2877	7693
Aft cell starts feeding when	2637	7453
Intermediate tanks start feeding when	1828	5944
Wing scavenge pumps start when	1535	4259

NOTE

When total fuel reading is 1500 pounds or less, and fuel flow is 4000 pounds per hour or less, the forward gage should not indicate more than 200 pounds less than the total gage.

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 non-selected drop tanks:

1. Climbing from a low altitude to a high altitude.
2. 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.
3. 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.

1. Loss of tertiary bus power, by any means, will de-energize all the drop tank shutoff valves. The valves open

FUEL GRADE PROPERTIES AND LIMITS

USE	FUEL TYPE	GRADE	NATO SYMBOL	US MILITARY SPECIFICATION	FREEZE POINT (°F)	LIMITS
RECOMMENDED FUEL	WIDE CUT GASOLINE	JP 4	F-40	MIL-J-5624	-76	
ALTERNATE FUEL	WIDE CUT GASOLINE	COM JET B	NONE	ASTM	-56	1, 2
		JP 5	F-44	MIL-J-5624	-51	1
	KEROSENE	COM JET A-1	NONE	ASTM	-54	1, 2
		COM JET A	NONE	ASTM	-36	1, 2
			F-34	NONE	-58	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. See limits Section V.
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 cleanliness 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.

Figure 7-1

and all drop tanks are pressurized, causing simultaneous feeding from all drop tanks.

2. Failure of a drop tank shutoff valve causes this drop tank to also feed when other drop tanks are selected.

3. 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.

WARNING

Prolonged use of afterburner at any altitude, and high non-afterburner thrust settings at low altitude, can result in fuel consumption rates that exceed fuel transfer capabilities. The forward fuselage tank gage should be monitored frequently and high thrust settings discontinued if rapid forward tank depletion is noted.

Fuel is transferred to the forward fuselage 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 operation, 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. If fuel transfer rate is slower than the consumption rate, the transfer pump transfers fuel until the transferring tank is empty. A simplified fuel transfer diagram is shown in figure 7-2.

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

FUEL TRANSFER

FUEL IS FED TO THE FORWARD FUSELAGE TANK FROM DROP TANKS AND FROM ALL OTHER INTERNAL FUEL TANKS AT LEVEL INDICATED.

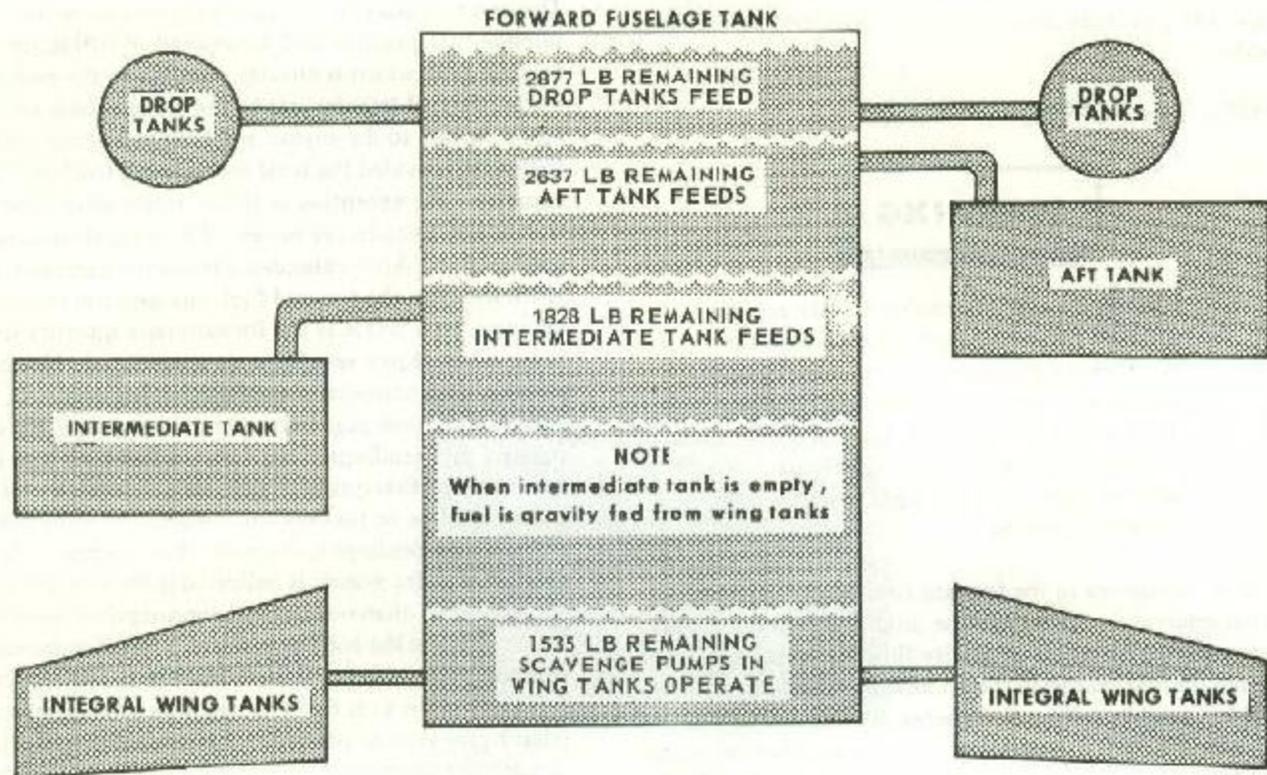


Figure 7-2

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 7-3.) Air for this heat exchanger is drawn from the intake duct by two fans within the heat exchanger and exhausted back into 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 7-3.) 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.

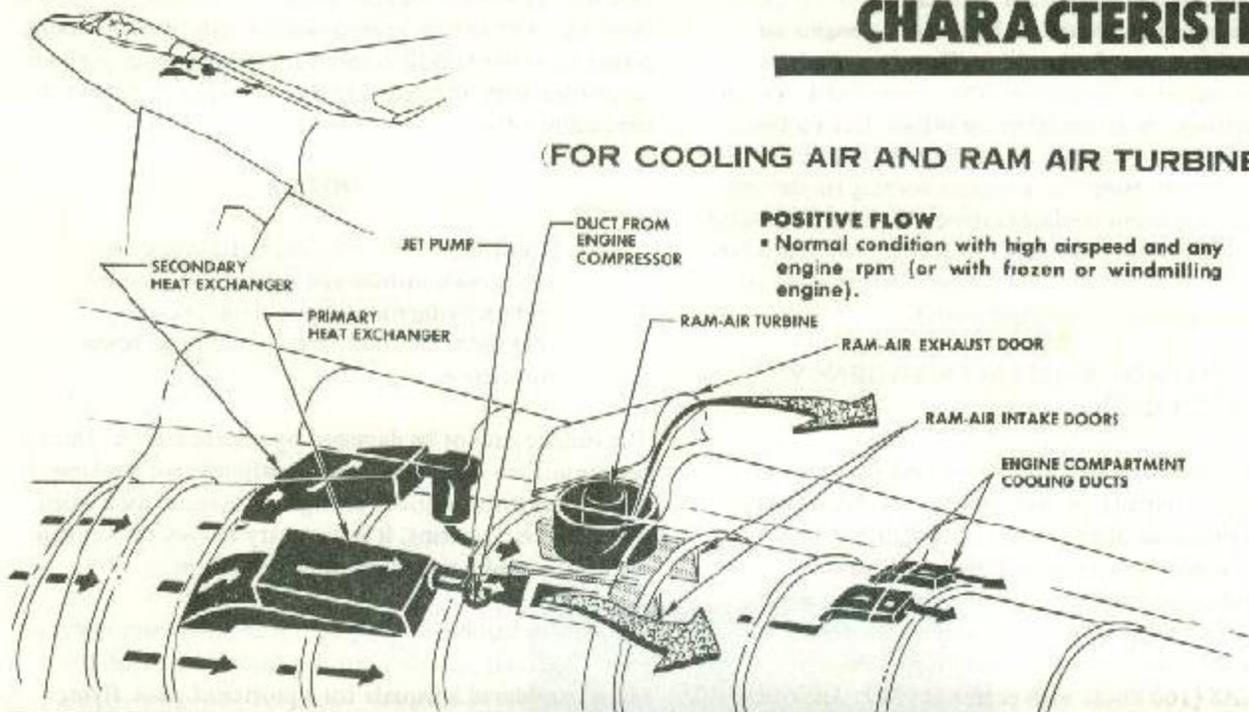
Null flow will occur in low-Mach-number, high-power flight, when the engine duct pressure is equal to the ambient air pressure. The result is no airflow through the ram-air turbine or around the engine. During normal in-flight operations, null flow conditions may be encountered for short periods of time. 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 7-4.)

CIRCUIT-BREAKER USE.

A circuit breaker is designed to protect the operating units within a particular electrical circuit from overloads or short

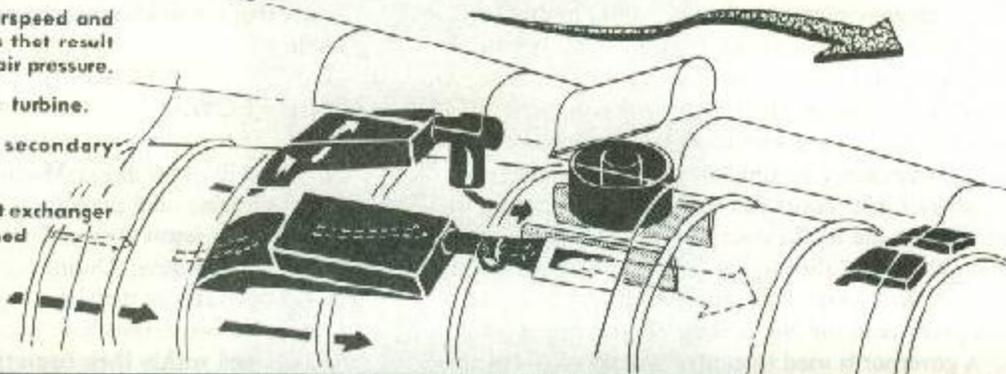
INTAKE DUCT AIRFLOW CHARACTERISTICS

(FOR COOLING AIR AND RAM AIR TURBINE)



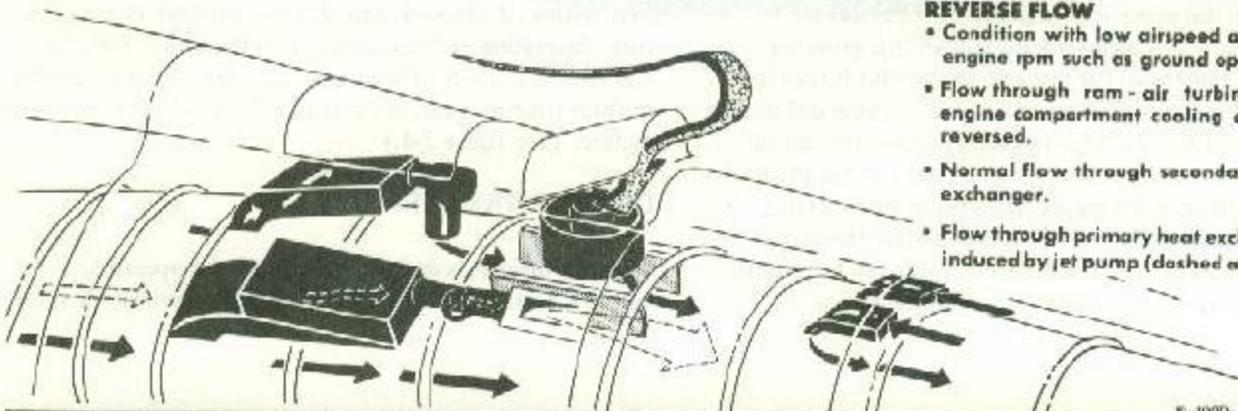
NULL FLOW

- 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).



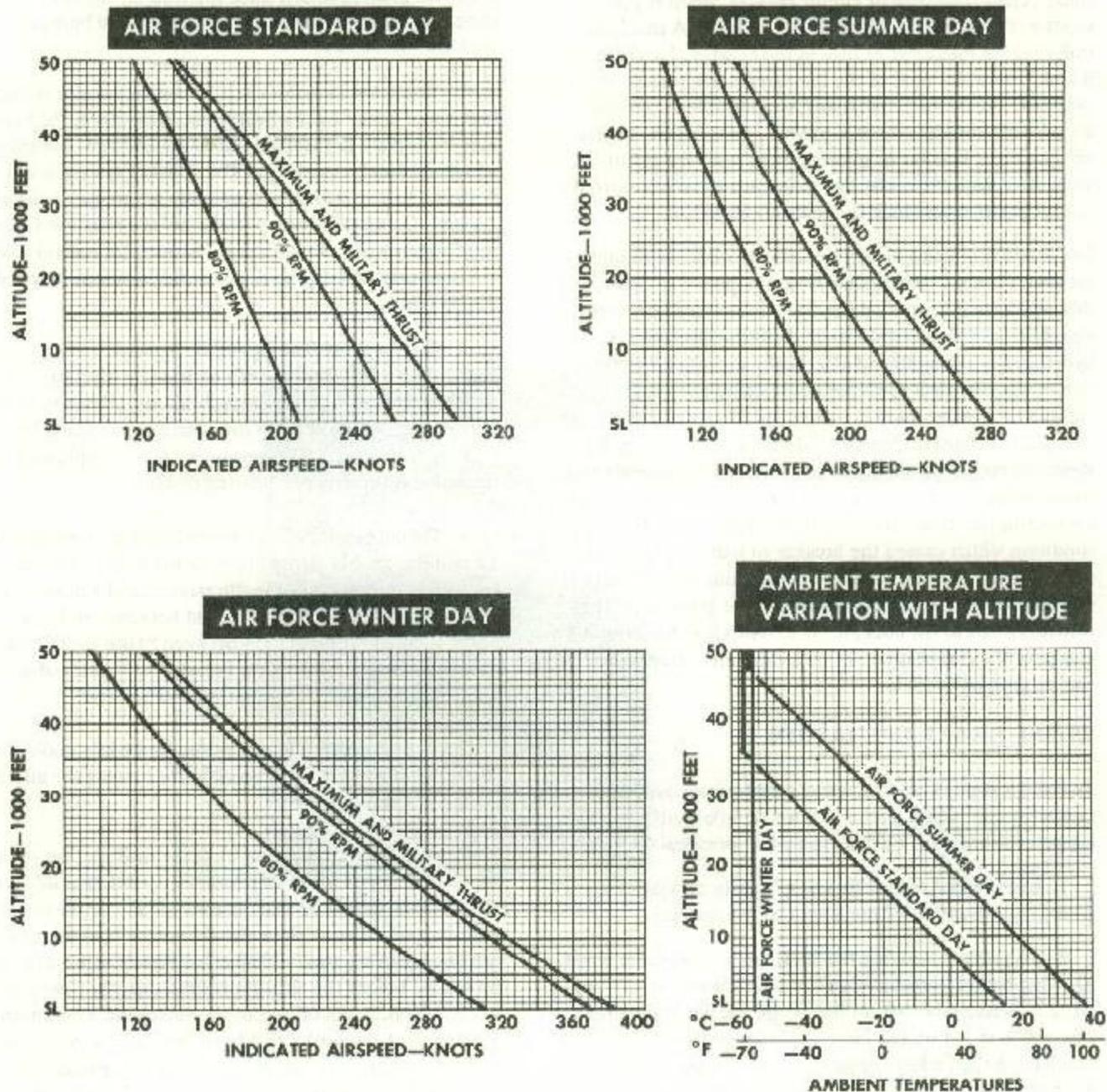
F-100D-1-A52-5

Figure 7-3

NULL FLOW CONDITIONS

J57 ENGINE

F-100 SERIES



100-1-79-044C

Figure 7-4

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 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:

1. Use the brakes as little and as lightly as possible by taking full advantage of the length of the runway.
2. 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.

3. 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.

4. 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.

5. 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.

6. 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.

7. The brakes should not be dragged while taxiing, and should be used as little as possible for turning the airplane on the ground.

8. 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.

**Section VIII
CREW DUTIES**

Not applicable to this airplane

ALL-WEATHER OPERATION

section

IX



P-107D-1-3-80

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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.

NOTE

This airplane is in approach category E.

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 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.

JET PENETRATION- (TYPKAL)

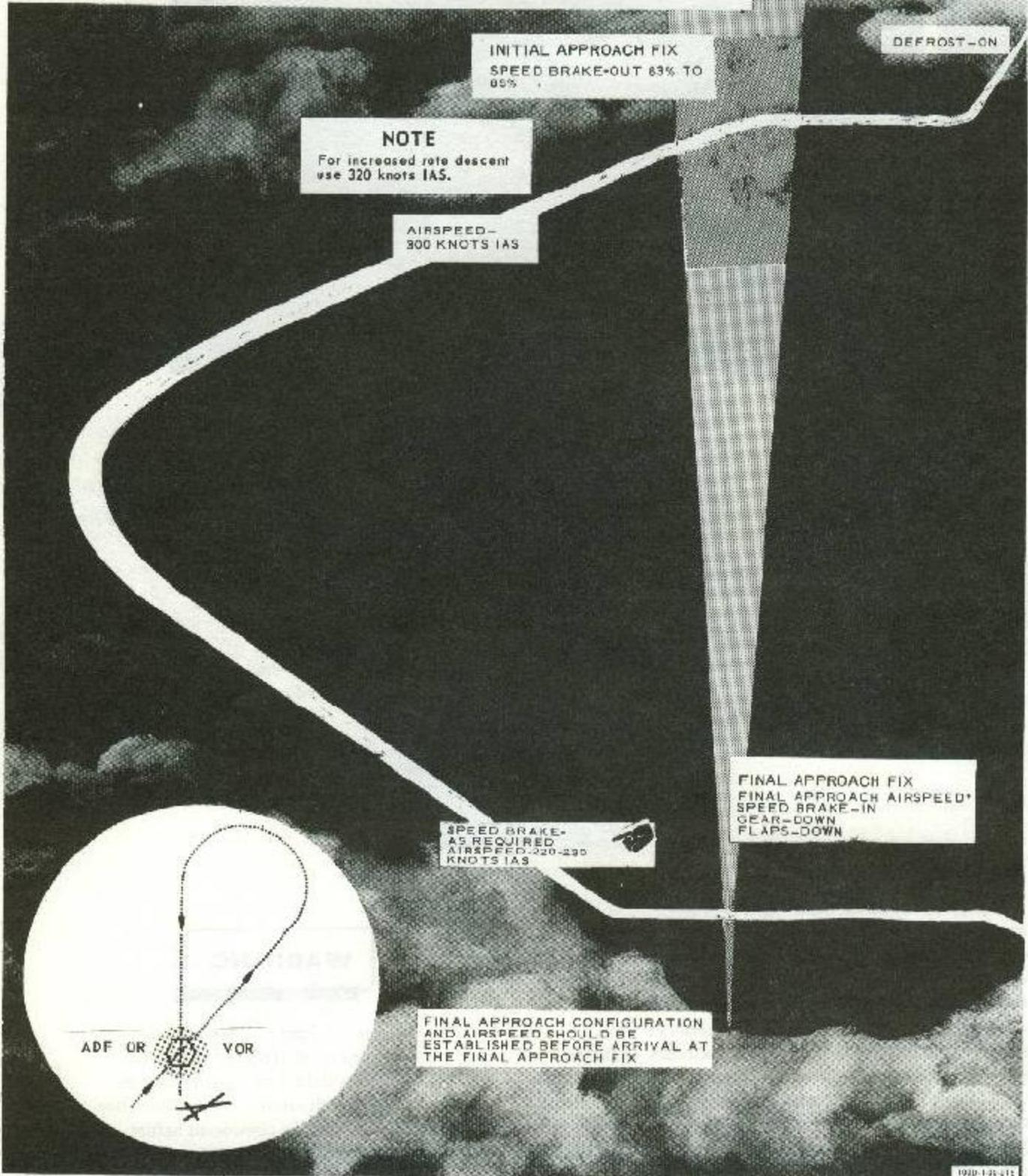


Figure 9-1 (Sheet 1 of 2)

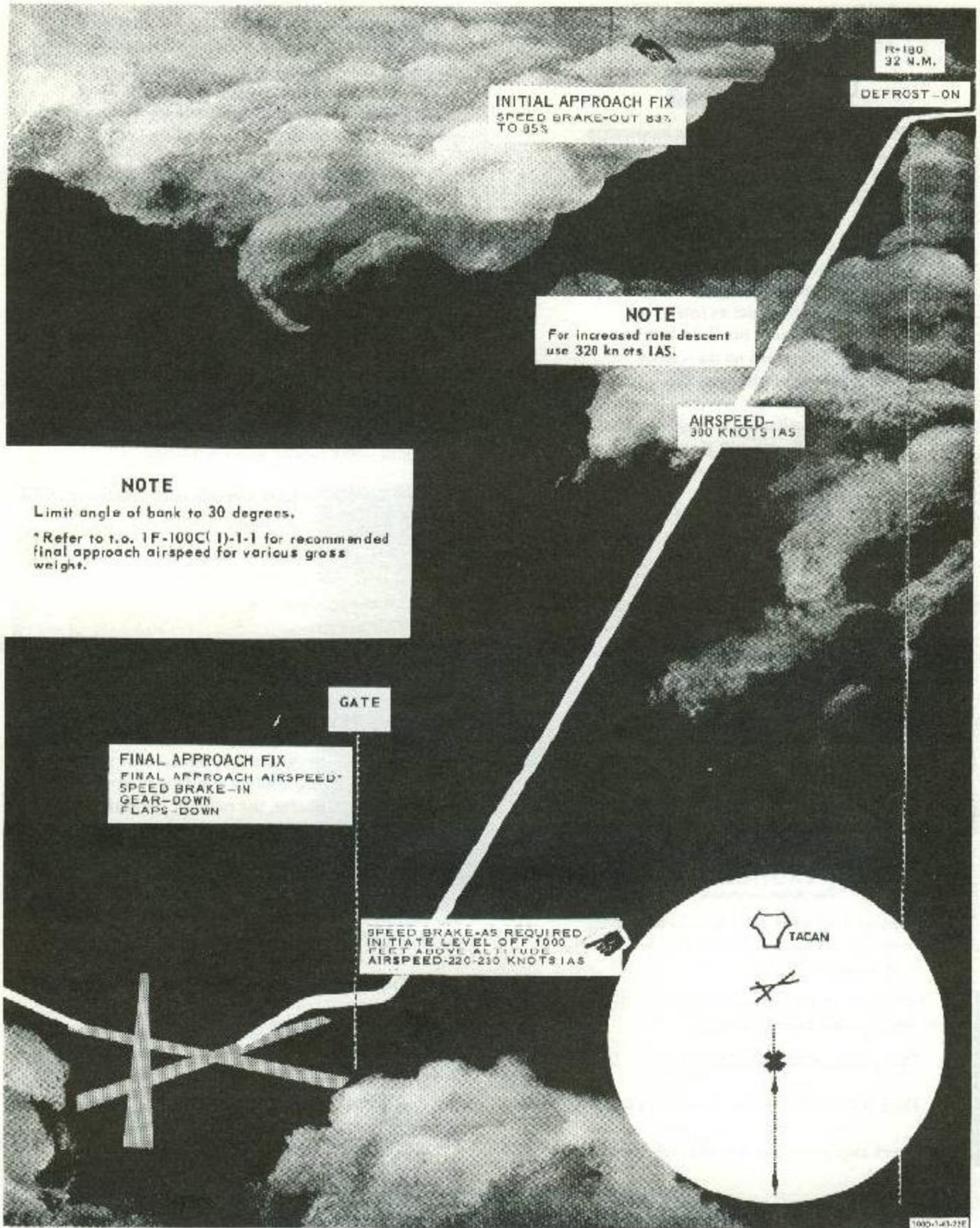


Figure 9-1 (Sheet 2 of 2)

WARNING

When the attitude indicator is inoperative and the turn-and-slip indicator is being used as a primary flight instrument, observe the following instructions.

- Avoid excessive rate of roll. The turn needle 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 longitudinal axis.
- Maintain a constant bank angle during turn. The indicator will then show correct direction and rate of turn.

BEFORE INSTRUMENT TAKEOFF.

1. Line up visually with centerline of runway.
2. Heading indicator — Check with runway heading.
3. Attitude indicator — Set to level flight indication. Use the pitch trim knob to superimpose the miniature aircraft over the horizon bar.
4. Windshield exterior air switch — ON if ice has accumulated on windshield, or if forward visibility 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. Guidevane anti-icing switch—ON if icing conditions will be encountered during departure.
6. Canopy and windshield defrost level — INCREASE.
7. Hold brakes, and advance throttle to full MILITARY.
8. Check engine instruments and recheck all flight instruments.

INSTRUMENT TAKEOFF 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 approximately 8 to 10 degrees.

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 when 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 radio compass and TACAN 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.

Use 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 1F-100C(I)-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 Approaches.

NOTE

This airplane is in approach category E. Approach categories are based on airplane approach speed at maximum landing gross weight. Category E is approach speed greater than 165 knots, weight not considered.

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 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.

CIRCLING APPROACH.

1. Landing gear down and flaps intermediate prior to final approach fix.
2. Airspeed 200 KIAS or computed final approach speed plus 20 knots whichever is higher.
3. On base leg, lower full flaps and fly a normal approach.

NOTE

A circling approach is difficult and demanding because of the reduced maneuverability in the circling configuration and a visual perspective that differs considerably from a normal VFR approach. The normal tendency when flying a low altitude circling approach is to fly the pattern too tightly and overshoot the turn to final. Aircraft turning radius is larger when making the level or slightly descending turn to final involved in a circling approach.

- The slab will retrim nose down when the flaps are moved from intermediate to full down.

Missed Approach.

1. Advance throttle as required and check speed brake in.
2. Establish climb attitude.
3. Retract landing gear after vertical velocity indicator and altimeter show a positive rate of climb.
4. Flaps up at no flap final approach speed for weight (half flap setting may be used to aid in acceleration).
5. Accelerate to 230 knots IAS or as desired.

RADAR APPROACH (TYPICAL)

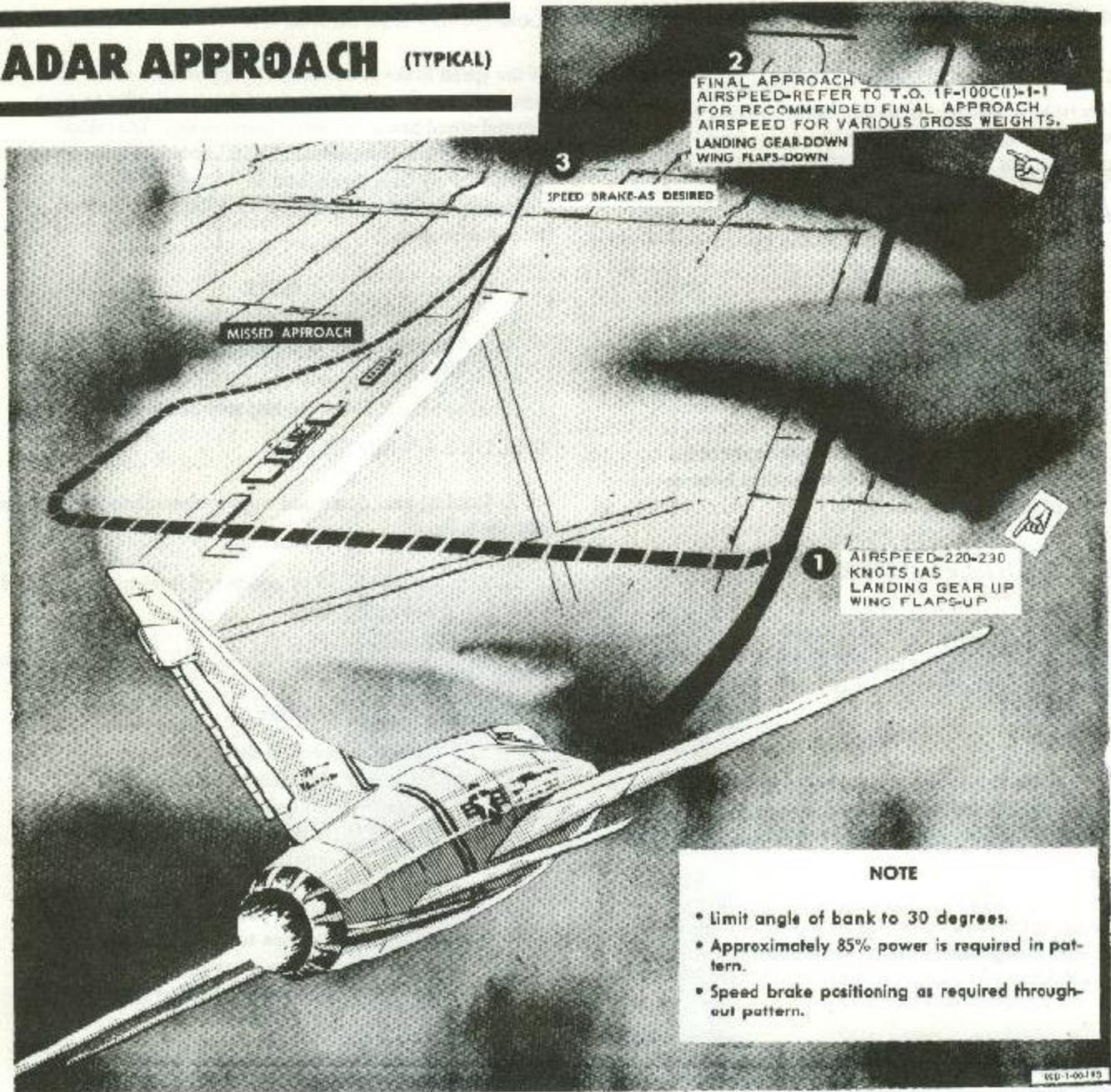


Figure 9-2

6. Fly missed approach as published or as instructed by the controlling agency.

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.

CAUTION

The forward windshield may become completely obscured in heavy rain, particularly when power is reduced toward IDLE during approach and landing. Visual reference to the runway can then be maintained only through the sides of the canopy behind the canopy bow.

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 takeoff 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 takeoff 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 by 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 icing conditions.
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.
4. Guide-vane anti-ice switch — ON.

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 flame-outs 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, will normally result in constant airspeed, regardless of any false readings of the airspeed/Mach indicator.

ENGINE SURGE AND FLAME-OUT CAUSED BY ADVERSE WEATHER CONDITIONS.

The following factors, singly or in combination, can cause engine flame-out:

1. Penetration of cumulus build-ups with associated high liquid content.
2. Engine icing of either nose accessory section cover or inlet guide vanes.
3. Turbulence associated with penetration can result in excessive nose-up angles of attack, causing marginal engine performance.
4. 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



**BEST
PENETRATION
SPEED**

275

KNOTS IAS

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 de-icer. Whenever possible, icing conditions should be anticipated in advance and the engine guide vane anti-icing switch should be turned to 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.

CAUTION

Landing and taxi lights may be used during takeoff; however, the moving light

beams may cause disorientation during airplane rotation.

- **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.

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.

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, takeoff 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

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.

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 -40°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.

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 TAKEOFF.

Make normal full-power engine check. However, if field conditions make this impossible, final checks must be made during the first part of the takeoff run.

AFTER TAKEOFF.**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 takeoff and before initial climb. (Refer to Engine Fuel Control Unit in section I.)

1. After takeoff 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 require 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 temperature 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.).

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. 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 TAKEOFF.

Limit use of brakes as much as possible, because brake cooling is reduced when outside air temperature is high.

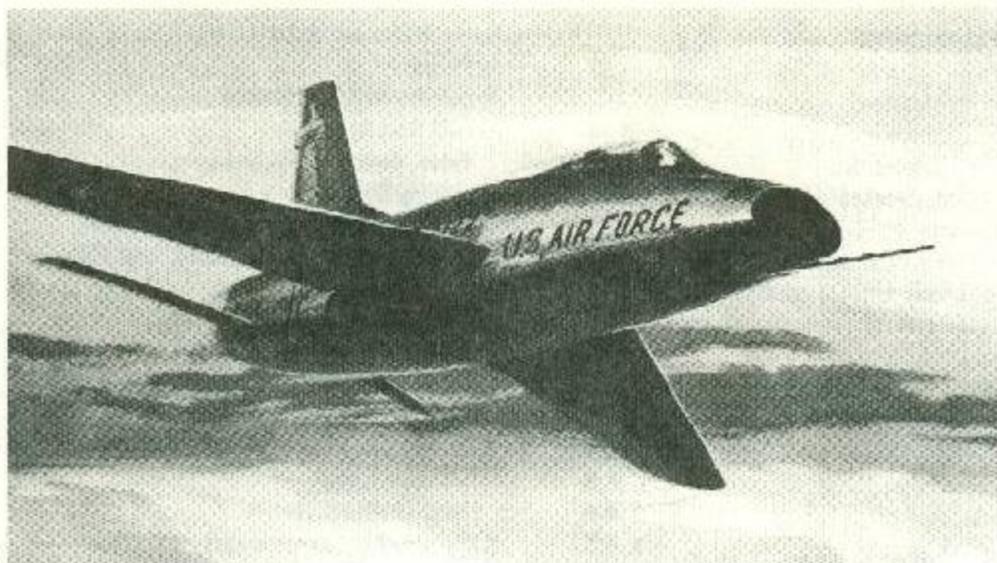
TAKEOFF.

NOTE

It is imperative that takeoff be made at recommended speeds. When outside air temperature is high, do not lift nose wheel from runway too soon, because more than usual takeoff run will be required to obtain recommended takeoff 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.



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