RAS 4767

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of:	)	Docket No. 72-22-ISFSI
PRIVATE FUEL STORAGE, LLC (Independent Spent Fuel Storage Installation)	)	ASLBP No. 97-732-02-ISFSI
	)	August 16, 2002

FILING OF STATE OF UTAH EXHIBIT 224

As directed by the Board at the hearing in this proceeding on July 3, 2002 (Tr. 13718), the State files attached State Exhibit 224, consisting of pages from the F-16 Flight Manual T.O. 1F-16CG-1 for Blocks 40 and 42, 27 May 1996, Change 2, 8 September 1997 ("Block 40 Manual"). The Block 40 Manual was used by State witness Lt. Col. Hugh Horstman in connection with his testimony.

The Applicant has introduced various exhibits from a different F-16 Flight Manual identified as T.O. 1F-16C-1 for Blocks 25, 30 and 32, 4 January 1999, Change 2, 15 September 1999 ("Block 25 Manual"). The attached pages in this Exhibit 224 are pages from the Block 40 Manual that contain the corresponding subject matter, to the extent the

State was able to locate the same, that is shown on the pages from the Block 25 Manual that were included in the Applicant's Exhibits N, MMM, OOO, PPP, and 246.

DATED this 16th day of August, 2002.

Respectfully submitted,

Denise Chancellor, Assistant Attorney General
James R. Soper, Assistant Attorney General
Fred G Nelson, Assistant Attorney General
Connie Nakahara, Special Assistant Attorney General
Diane Curran, Special Assistant Attorney General
Laura Lockhart, Assistant Attorney General
Attorneys for State of Utah
Utah Attorney General's Office
160 East 300 South, 5th Floor, P.O. Box 140873
Salt Lake City, Utah 84114-0873
Telephone: (801) 366-0286, Fax: (801) 366-0292

CERTIFICATE OF SERVICE

I hereby certify that a copy of FILING OF STATE OF UTAH EXHIBIT 224 was served on the persons listed below by electronic mail (unless otherwise noted) (State Exhibit 224 is not being served electronically) with conforming copies by United States mail first class, this 16th day of August, 2002:

Rulemaking & Adjudication Staff
Secretary of the Commission
U. S. Nuclear Regulatory Commission
Washington D.C. 20555
E-mail: hearingdocket@nrc.gov
(original and two copies)

Michael C. Farrar, Chairman
Administrative Judge
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, DC 20555-0001
E-Mail: mcf@nrc.gov

Dr. Jerry R. Kline
Administrative Judge
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, DC 20555
E-Mail: jrk2@nrc.gov
E-Mail: kjerry@erols.com

Dr. Peter S. Lam
Administrative Judge
Atomic Safety and Licensing Board
U. S. Nuclear Regulatory Commission
Washington, DC 20555
E-Mail: psl@nrc.gov

Sherwin E. Turk, Esq.
Catherine L. Marco, Esq.
Office of the General Counsel
Mail Stop - 0-15 B18
U.S. Nuclear Regulatory Commission
Washington, DC 20555
E-Mail: set@nrc.gov
E-Mail: clm@nrc.gov
E-Mail: pfscase@nrc.gov

Jay E. Silberg, Esq.
Ernest L. Blake, Jr., Esq.
Paul A. Gaukler, Esq.
Shaw Pittman, LLP
2300 N Street, N. W.
Washington, DC 20037-8007
E-Mail: Jay_Silberg@shawpittman.com
E-Mail: ernest_blake@shawpittman.com
E-Mail: paul_gaukler@shawpittman.com

John Paul Kennedy, Sr., Esq.
David W. Tufts
Durham Jones & Pinegar
111 East Broadway, Suite 900
Salt Lake City, Utah 84111
E-Mail: dtufts@djplaw.com

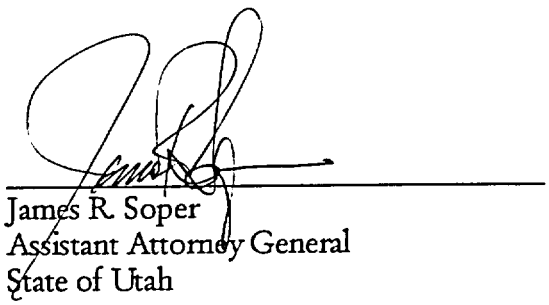
Joro Walker, Esq.
Land and Water Fund of the Rockies
1473 South 1100 East, Suite F
Salt Lake City, Utah 84105
E-Mail: utah@lawfund.org
(electronic copy only)

Larry EchoHawk
Paul C. EchoHawk
Mark A. EchoHawk
EchoHawk Law Offices
151 North 4th Street, Suite A
P.O. Box 6119
Pocatello, Idaho 83205-6119
E-mail: paul@echohawk.com

Tim Vollmann
3301-R Coors Road N.W. # 302
Albuquerque, NM 87120
E-mail: tvollmann@hotmail.com

James M. Cutchin
Atomic Safety and Licensing Board Panel
U.S. Nuclear Regulatory Commission
Washington, D.C. 20555-0001
E-Mail: jmc3@nrc.gov
(electronic copy only)

Office of the Commission Appellate Adjudication
Mail Stop: O14-G-15
U. S. Nuclear Regulatory Commission
Washington, DC 20555



James R. Soper
Assistant Attorney General
State of Utah

STATE EXHIBIT 224

Pages from

F-16 Flight Manual T.O. 1F-16CG-1
for Blocks 40 and 42, 27 May 1996, Change 2, 8 September 1997

corresponding to pages with the same subject matter from

F-16 Flight Manual T.O. 1F-16C-1
for Blocks 25, 30 and 32, 4 January 1999, Change 2, 15 September 1999

Applicant Exhibit N, Figure 3.

Following are pages from Block 40 Manual that contain subject matter corresponding to that shown on pages from Block 25 Manual included in Applicant Exhibit N, Figure 3.

Low Altitude Airstart Capability

DATA BASIS ESTIMATED

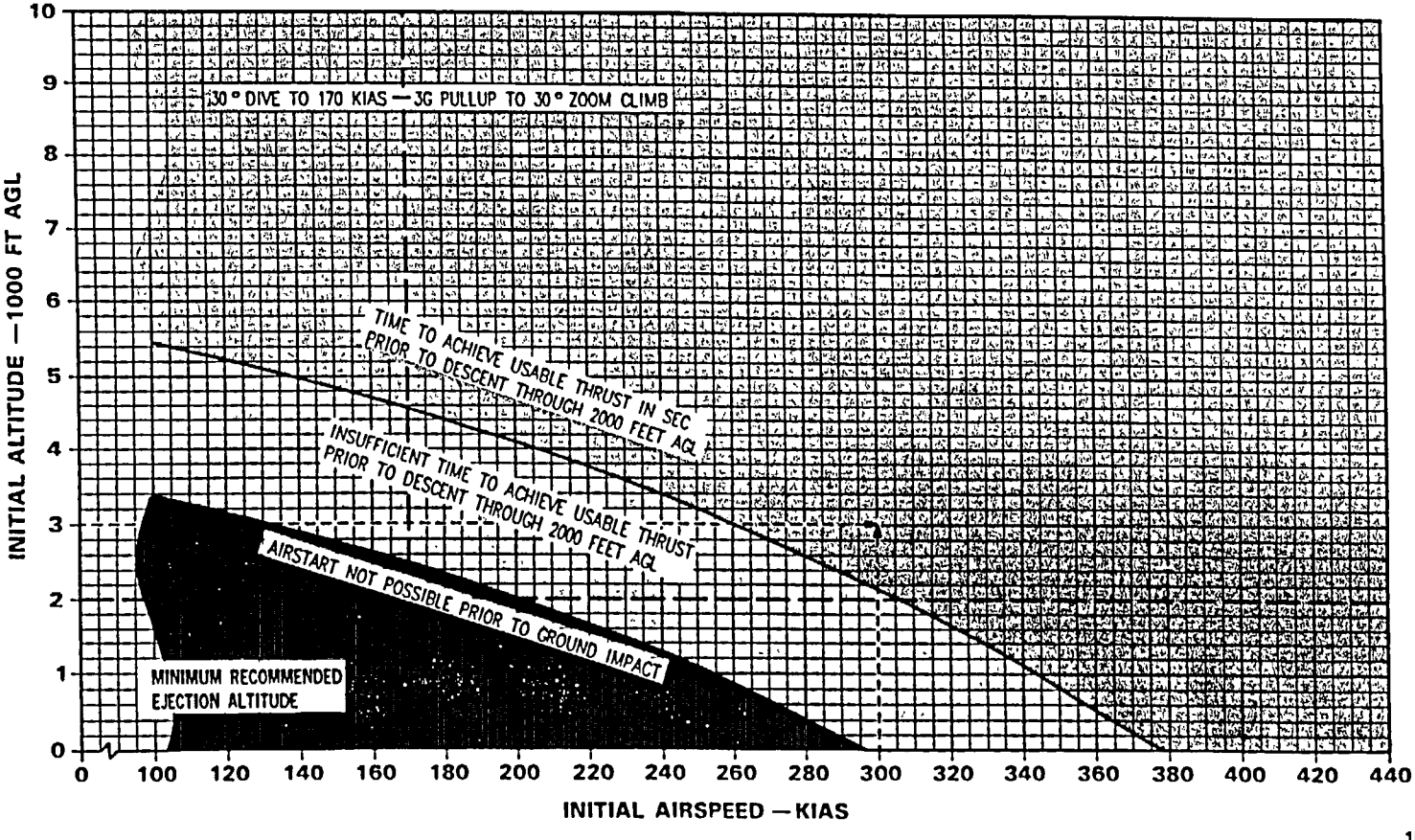
ENGINE F110-GE-100

CONFIGURATION:

- GW = 23,000-25,000 LB
- DI = 0-50
- LG — UP

CONDITIONS:

- 30° DIVE TO DESCENT KIAS OR 3G PULLUP TO 30° ZOOM CLIMB INITIATED FROM THE AIRSPEED/ALTITUDE EXISTING AT FIRST RECOGNITION OF ENGINE FAILURE
- AIRSTART INITIATED AT START OF DIVE OR ZOOM BY CYCLING THROTTLE TO OFF AND THEN MIDRANGE
- 45 SECONDS ASSUMED AFTER THROTTLE ADVANCE TO ACHIEVE USABLE THRUST (ASSUMES AIRSTART INITIATION AT 25 PERCENT RPM)
- DESCENT AIRSPEED IS 170 KIAS (SEC) (JFS PRESERVING RPM)



1F-16CG-1-1144X®

Figure 3-11.

Applicant Exhibit N, Figure 3-A.

Following are pages from the Block 40 Manual that contain subject matter corresponding to that shown on pages from the Block 25 Manual included in Applicant Exhibit N, Figure 3-A.

Low Altitude Airstart Capability

DATA BASIS ESTIMATED

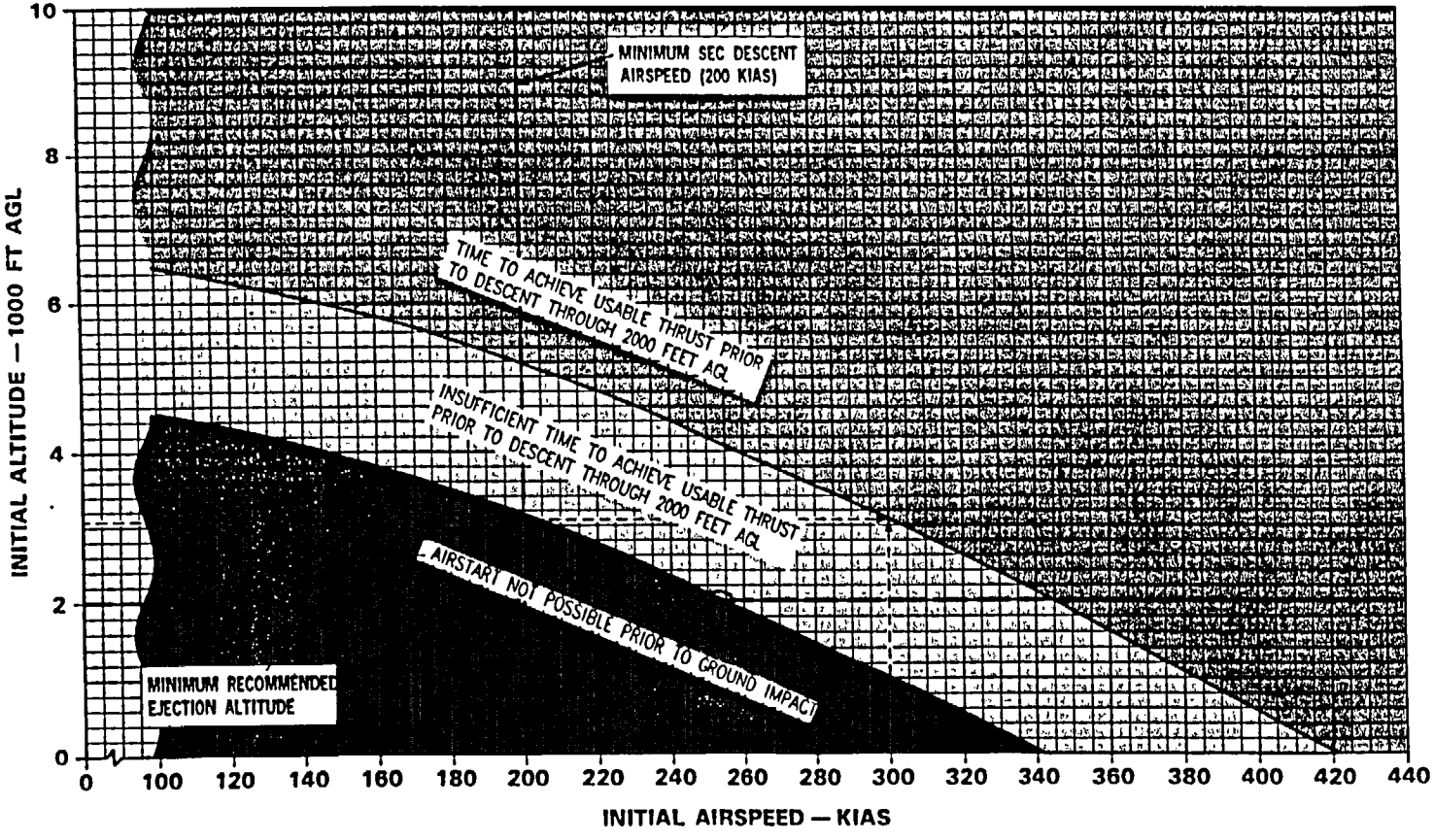
ENGINE F100-PW-220

CONFIGURATION:

- GW = 23,000–25,000 LB
- DI = 0–50
- LG — UP

CONDITIONS:

- 30° DIVE TO DESCENT KIAS OR 3G PULLUP TO 30° ZOOM CLIMB INITIATED FROM THE AIRSPEED/ALTITUDE EXISTING AT FIRST RECOGNITION OF ENGINE FAILURE (60 PERCENT RPM)
- AIRSTART INITIATED WHEN RPM REACHES 25–50 PERCENT (10 SECONDS AFTER INITIATION OF DIVE OR ZOOM)
- 45 SECONDS ASSUMED AFTER THROTTLE ADVANCE TO ACHIEVE USABLE THRUST
- DESCENT AIRSPEED IS 200 KIAS (SEC) (JFS PRESERVING RPM)



1F-16CG-1-1140A®

Figure 3-8.

Applicant Exhibit N, Tab T.

Following are pages from the Block 40 Manual that contain subject matter corresponding to that shown on pages from the Block 25 Manual included in Applicant Exhibit N, Tab T.

T.O. 1F-16CG-1

FLIGHT MANUAL

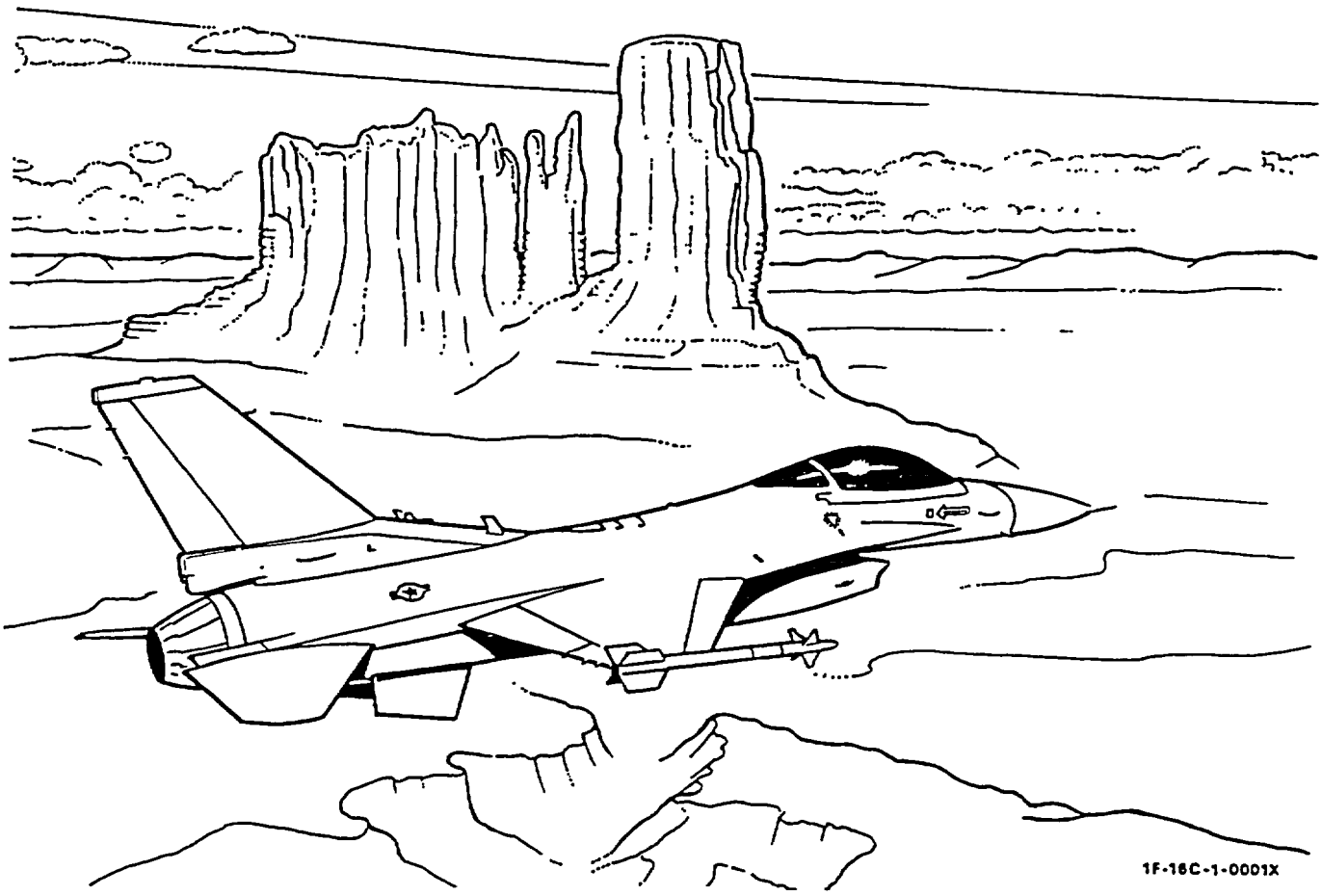
USAF SERIES AIRCRAFT

F-16C/D

BLOCKS 40 AND 42

LOCKHEED MARTIN CORPORATION

F33657-84-C-0247
F42620-95-D-0177



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

Published under authority of the Secretary of the Air Force.

NAVY - 2 Oct 97 - 3376

27 MAY 1996
CHANGE 2 8 SEPTEMBER 1997

UT-49949

If the engine stalls at low altitude, an immediate climb should be initiated. Retarding the throttle to MIL may clear the stall. If engine response at low altitude is not sufficient to maintain or gain altitude and a suitable field is not immediately available, ejection may be required.

Non-AB Engine Stalls [GE100]

Non-AB stalls may occur if the control system is malfunctioning, particularly during throttle transients. Non-AB stalls are often a symptom of a serious engine problem. Non-AB stalls may be inaudible; the first indication may be a lack of engine response to throttle movement which may be difficult to differentiate from abnormal engine response. However, non-AB stalls may be characterized by bangs, pops, low intensity engine rumble or vibration, and/or erratic orange-yellow flame from the engine exhaust. This exhaust flame could be mistaken for an engine fire. FTIT fluctuation and decreasing rpm will probably accompany stalls. If a stall(s) is confirmed, the throttle should be immediately retarded to IDLE. The engine may continue to stall at IDLE but the stall may not be audible, particularly at high altitudes. The engine instruments should be monitored for indications of stall. FTIT may increase while rpm decreases. If stalls continue, place ENG CONT switch to SEC. If the engine recovers, throttle movements should be minimized and made slowly until landing is assured.

If stalls continue, initiate airstart. Refer to AIRSTARTS [GE100], this section. When trying to clear stall(s) with an airstart, the throttle should be maintained in OFF for a few seconds to allow the stalls to clear. If the stalls continue after the airstart, the engine may have a serious hardware problem. The focus should shift to using available thrust to land at the nearest divert field.

Engine Stall Recovery [GE100]

If an AB stall(s) occurs:

1. Throttle – Snap to MIL.

If AB stalls do not clear or stall(s) occurs below AB:

NOTE

Non-AB stalls may be inaudible.

2. Throttle – IDLE.

If stalls continue:

3. ENG CONT switch – SEC.

If stalls continue:

4. Throttle – OFF for a few seconds, then initiate airstart. Refer to AIRSTART PROCEDURES [GE100], this section.

NOTE

For serious hardware problems, the engine may operate normally at idle rpm but exhibit stall/vibration conditions at thrust settings above idle rpm. Attempting additional airstarts will not clear the condition. Use the highest thrust setting below the stall/vibration condition to sustain flight.

If stalls continue:

5. Land as soon as possible using available thrust. Refer to FLAMEOUT LANDING, this section.

NOTE

If thrust is too low to sustain level flight, maximum range airspeed is 200 knots. Increase airspeed by 5 knots per 1000 pounds of fuel/store weights over [C] 1000, [D] zero pounds. This equates to approximately 7 degrees AOA.

If stall(s) clears:

6. Throttle – MIL or below. Minimize throttle movements and make necessary movements slowly.
   If stall(s) occurred in:

   - AB at 30,000 feet MSL or above and while subsonic, the engine is safe to operate in the IDLE to MIL range provided no other abnormal engine indications are observed.
   - AB below 30,000 feet MSL or while supersonic, land as soon as possible.
   - MIL or below, land as soon as possible.

INLET BUZZ [GE100]

Inlet buzz occurs at supersonic airspeeds if an engine control system failure or a CADC mach signal failure results in insufficient airflow or if the throttle is retarded below MIL while operating in SEC. Inlet buzz causes moderate to severe vibration within the cockpit and may result in multiple engine stalls.

If inlet buzz occurs, the throttle should not be moved until subsonic. Decrease airspeed to subsonic as quickly as possible by opening the speedbrakes and increasing g. If engine stalls occur and persist, the throttle should be retarded to IDLE when subsonic. If the stalls do not clear, retard the throttle to OFF for a few seconds, then advance to midrange. Refer to AIRSTART PROCEDURES [GE100], this section.

BIRD STRIKE [GE100]

In the event of a bird strike or suspected bird strike, AB should be used only if absolutely necessary. It is possible to lodge bird remains in the AB system such that liner damage and subsequent duct burn-through occurs if AB is used. There is no concern of liner damage during any non-AB operation. Refer to ABNORMAL ENGINE RESPONSE [GE100],this section, if appropriate.

ENGINE OVERSPEED [GE100]

An overspeed occurs when rpm exceeds 106 percent. If an overspeed occurs, the 103 DEC, **LESS** 103 AFTC attempts to reduce rpm. However, if the 103 DEC, **LESS** 103 AFTC malfunctions and engine rpm reaches 110 percent, the overspeed protection in the MEC closes the overspeed fuel shutoff valve resulting in a flameout. To restore fuel, retard the throttle to OFF then advance to midrange. Refer to AIRSTART PROCEDURES [GE100], this section.

ENGINE FAILURE OR FLAMEOUT [GE100]

If the engine flames out, fuel starvation or mechanical failure has occurred.

A flameout is indicated by a decrease in FTIT and engine rpm decaying below in-flight idle (approximately 70 percent rpm). Loss of thrust and lack of response to throttle movement confirm the flameout. The ENGINE warning light illuminates when engine rpm goes below 60 percent. Additionally, the MAIN GEN and STBY GEN lights illuminate below 50 percent rpm and the EPU should start running. Do not mistake a loss of ECS noise as an engine flameout.

A flameout indicates an engine control failure, fuel starvation, fuel system malfunction, or fuel cutoff due to engine overspeed protection. If the engine flames out, two features may instantly restart the engine. There is an autorelight feature and the capability to automatically transfer to SEC if certain faults are detected in PRI. If these features work, the restart may take place instantly and the flameout may not be noticeable (except for the illumination of the SEC caution light). In this situation, remain in SEC. (Refer to SEC CAUTION LIGHT [GE100], this section.)

If the flameout progresses to the point that it is noticeable, retard the throttle to OFF, then advance to midrange. Refer to AIRSTART PROCEDURES [GE100], this section.

Tower Shaft Failure [GE100]

Failure of the engine tower shaft or its associated geartrain results in engine flameout due to fuel starvation. A restart is not possible; primary emphasis should be on a flameout landing. If unable to make a flameout landing, refer to EJECTION (TIME PERMITTING), this section. Because tower shaft failure results in the loss of rotation to the engine-driven gearbox and ADG, the initial symptoms are similar to main fuel pump failure. The primary differences are that the rpm indication drops immediately to zero and ENGINE warning light and the SEC caution light illuminate since the engine alternator is no longer providing power to the 103 DEC, **LESS** 103 AFTC.

The JFS should be started immediately upon entering the JFS envelope to conserve EPU fuel. The JFS drives the ADG and the engine gearbox which restores rotation to both hydraulic pumps and provides a reduced FLCS PMG output. Depending on JFS performance and load, rpm may even be high enough to restore standby generator power; however, main generator power may cycle on and off. Without the load of the engine, the JFS produces a 30-55 percent rpm indication, which is the speed of the engine gearbox and not the actual engine rpm. The true engine rpm is unknown.

Low Altitude Engine Failure or Flameout [GE100]

Refer to figures 3-10 and 3-11. Initial reaction to any malfunction at low altitude should be to trade excess airspeed for altitude. Higher altitude translates directly to either additional time to achieve an airstart or to additional glide range to reach a suitable landing field. Above 310 knots, more time is available by a zoom climb using a 3g pullup to 30-degree climb angle until approaching the desired airspeed (use approximately 50 knots lead point) and then initiating a zero-g pushover. Below 310 knots, more time is available by performing a constant altitude deceleration to the desired airspeed; if required, climb to achieve minimum recommended ejection altitude.

If the zoom results in an altitude below 4000 feet AGL, there may be insufficient time to achieve an airstart prior to reaching minimum recommended ejection altitude. In that case, primary consideration should be given to preparing for ejection; do not delay ejection below 2000 feet AGL.

If low altitude engine failure occurs:

1. Zoom.
2. Stores – Jettison (if required).
   If stores jettison is attempted after main and standby generators drop off line but before EPU generator comes on line (up to 2 seconds delay), stores will not jettison.
3. Perform airstart in SEC (if altitude permits). Refer to AIRSTART PROCEDURES, this section.

WARNING

Below 4000 feet AGL, there may be insufficient time to perform an airstart prior to minimum recommended ejection altitude.

AIRSTARTS GE100

Refer to figure 3-12. Airstarting the engine does not require exact airspeeds or rpm ranges, but there are key events in the airstart sequence that must be performed in a timely manner in order to have the best chance for an airstart. The key events are initiating the airstart while engine rpm is still high, selecting SEC if there is no light-off prior to rpm decaying below 50 percent in PRI (or immediately when below 10,000 feet AGL), and preserving engine rpm prior to light-off.

Factors such as altitude, airspeed, weather, etc., must be considered in determining whether to try an airstart, to accomplish a flameout landing, or to eject. Jettisoning stores reduces altitude loss during an airstart and improves glide ratio during flameout landing.

If gliding distance is not a factor, maintain 250 knots or more in order to reduce rpm rate of decay until the JFS can be started. The engine can be airstarted with airspeeds from 170-400 knots/0.9 mach; however, 250 knots provides the best tradeoff of altitude loss, range, and airflow for the engine.

In flight, the throttle must be retarded to OFF then back to the operating range for only four reasons: to reset the overspeed protection logic, to clear a stall, to begin the airstart procedure, or to terminate a hot/hung start. Exact throttle position is not important for an airstart in either PRI or SEC, so any position between IDLE and MAX AB is acceptable; however, the midrange position is preferred because of possible throttle misrigging at IDLE or possible engine overspeed shutdown at MIL or above.

Once the throttle is retarded to OFF and then back to the normal operating range, do not retard the throttle to OFF again during the airstart unless a hot/hung start occurs. Unnecessarily retarding the throttle to OFF terminates any start attempt which may be in progress.

A successful restart depends on many variables: cause of flameout, type of fuel, altitude, airspeed, and engine rpm when the airstart is attempted. High engine rpm is the most important variable and provides the best chance of a successful restart. Therefore, do not delay the initiation of an airstart in an attempt to reach a particular flight condition. Initiate the airstart as soon as it becomes apparent that engine rpm has decayed below in-flight idle (approximately 70 percent rpm) or illumination of the ENGINE warning light, engine instrument indications, and no response to throttle movement confirm a flameout. The best conditions for either a PRI or SEC airstart are below 30,000 feet MSL, at 250 knots or more, and with high engine rpm.

At medium and high altitudes, the airstart attempt should be started in the engine control mode selected by the 103 DEC, **LESS** 103 AFTC (either PRI or SEC). The 103 DEC, **LESS** 103 AFTC contains diagnostic logic designed to identify PRI engine control failures and may automatically transfer to SEC. If there is no indication of a light-off before rpm decays below 50 percent, place ENG CONT switch to SEC (even if the SEC caution light is on) and the airstart attempt continued. At low altitude (below 10,000 feet AGL), SEC should be selected as soon as possible after initiating the airstart.

Of equal importance to selecting SEC when required is preserving engine rpm. The JFS should be started as soon as the aircraft is in the JFS envelope. The advantage of using the JFS to assist the airstart is that once the JFS is preserving rpm, airspeed can be reduced.

Low Altitude Zoom Capability

DATA BASIS ESTIMATED

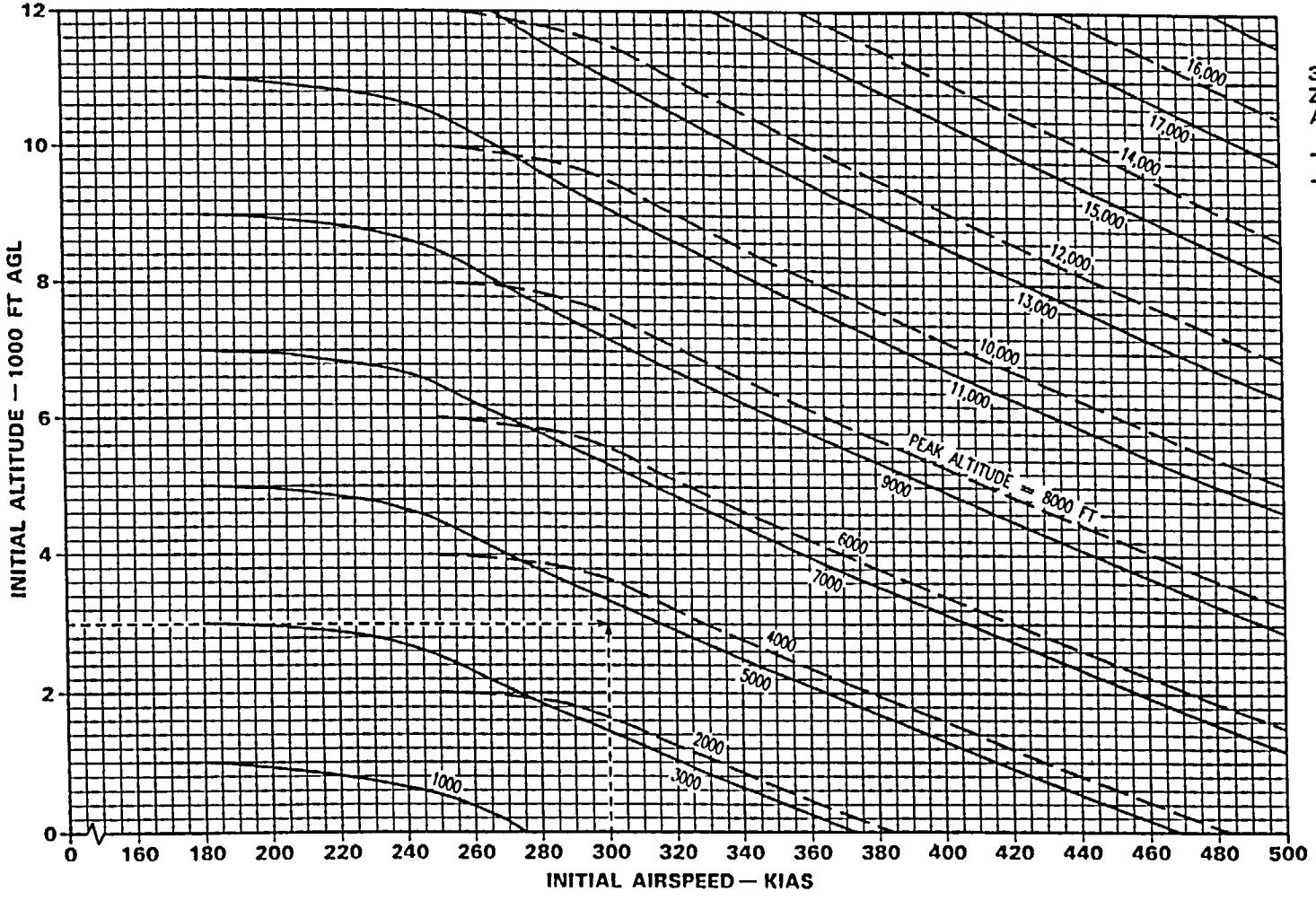
ENGINE F110–GE–100

CONFIGURATION:

- GW = 23,000–25,000 LB
- DI = 0–50
- LG — UP

CONDITIONS:

- WINDMILLING OR SEIZED ENGINE
- 30-DEGREE CLIMB MAINTAINED TO 170/250 KIAS



1F-16X-1-0025X

Figure 3-10.

Low Altitude Airstart Capability

DATA BASIS ESTIMATED

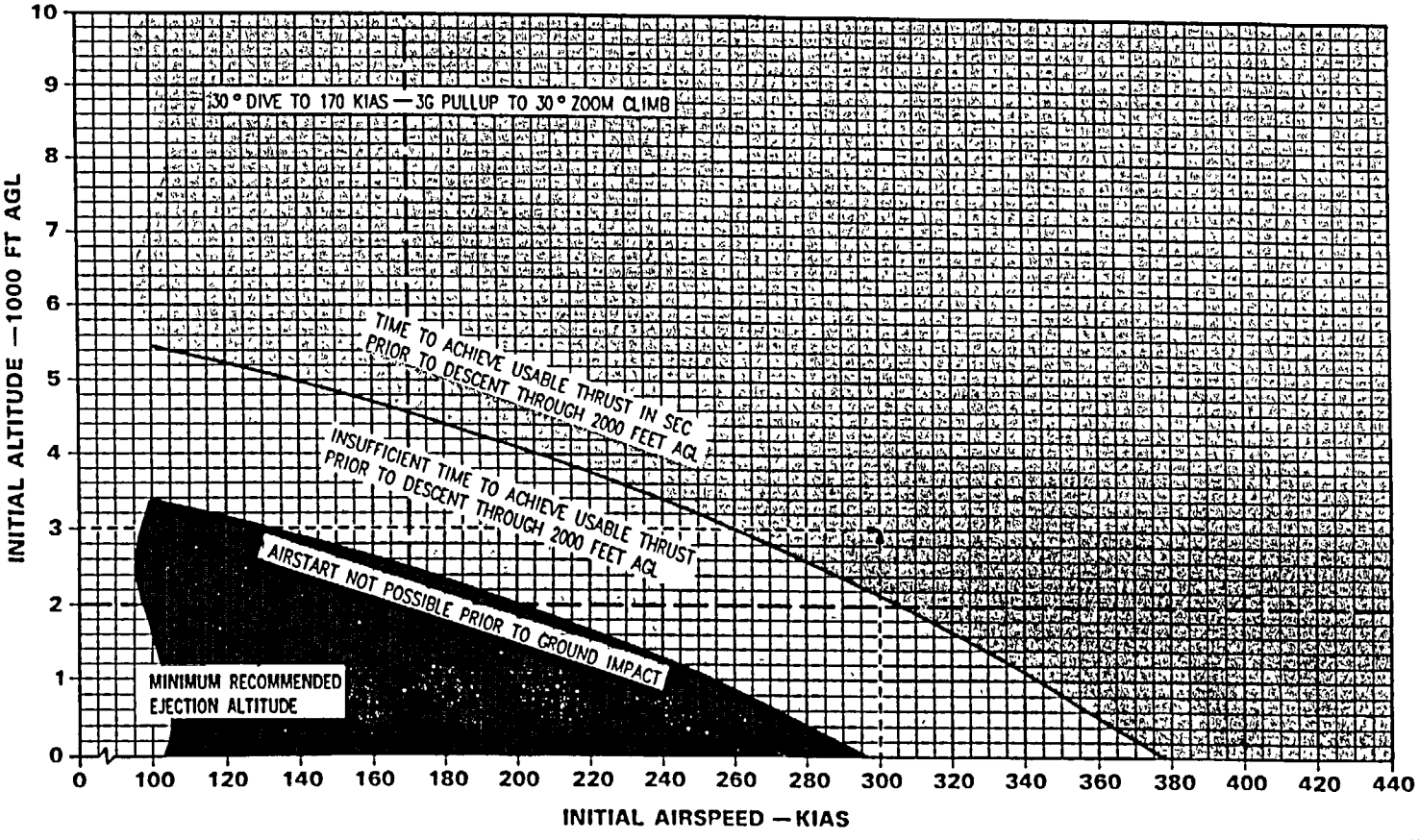
ENGINE F110-GE-100

CONFIGURATION:

- GW = 23,000-25,000 LB
- DI = 0-50
- LG — UP

CONDITIONS:

- 30° DIVE TO DESCENT KIAS OR 3G PULLUP TO 30° ZOOM CLIMB INITIATED FROM THE AIRSPEED/ALTITUDE EXISTING AT FIRST RECOGNITION OF ENGINE FAILURE
- AIRSTART INITIATED AT START OF DIVE OR ZOOM BY CYCLING THROTTLE TO OFF AND THEN MIDRANGE
- 45 SECONDS ASSUMED AFTER THROTTLE ADVANCE TO ACHIEVE USABLE THRUST (ASSUMES AIRSTART INITIATION AT 25 PERCENT RPM)
- DESCENT AIRSPEED IS 170 KIAS (SEC) (JFS PRESERVING RPM)



1F-16CG-1-1144X®

Figure 3-11.

An airstart can be rapid if light-off occurs above 60 percent rpm. Airstarts initiated between 25-50 percent engine rpm are slow to light off and may take up to 90 seconds to regain usable thrust. If altitude is available, increasing airspeed can assist engine acceleration and decrease the time to regain usable thrust once a light-off is achieved. As long as engine rpm continues to increase, this condition should not be considered as a hung/no start. Spooldown airstarts initiated below 25 percent rpm have been successful during flight tests, but spool up to usable thrust may take more time than is available. Keep engine rpm at 25 percent or above during spooldown airstarts, if possible.

Following the rapid FTIT rise and peak of a light-off, FTIT slowly decreases approximately 50°C. Therefore, do not confuse a drop in FTIT as an unsuccessful airstart unless accompanied by decreasing rpm as well.

High Altitude Airstart Considerations GE100

As altitude is increased above 30,000 feet MSL, the probability of a successful airstart can be improved by attempting the airstart as soon as possible (before rpm decays below approximately 50 percent) and by quickly descending to altitudes below 30,000 feet MSL after the airstart is initiated. Airspeeds above 250 knots (400 knots/0.9 mach maximum) should be considered as a means to reduce altitude and increase the probability of a successful airstart. Spooldown airstarts can be achieved with rpm as low as 25 percent, but not at all airspeeds and altitudes.

At high altitudes, dive as required to maintain speed in the 250-400 knot/0.9 mach range. Unless an airstart is obviously impossible (total lack of fuel, tower shaft failure, engine seizure, etc.), do not become tempted to establish a maximum range or maximum endurance glide. The first consideration should be an immediate spooldown airstart attempt even if the engine fails for no apparent reason. If a spooldown airstart is not successful before reaching 20,000 feet MSL, a JFS-assisted airstart should be attempted. When below 20,000 feet MSL, turn JFS on. Activating the JFS above 20,000 feet MSL is prohibited since successful JFS start/motoring of engine is unlikely and the brake/JFS accumulators will be depleted. If the JFS is preserving rpm, airspeed may be reduced to achieve maximum range or maximum endurance (200 or 170 knots, respectively, plus 5 knots per 1000 pounds of fuel/store weights over [C] 1000, [D] zero pounds). Time constraints due to EPU fuel consumption must also be considered. A maximum range or maximum endurance glide from above approximately 35,000 feet MSL may exhaust EPU fuel prior to landing. (Refer to T.O. 1F-16CG-1-1, figure B6-3.) With the JFS running, EPU fuel consumption is also reduced.

Low Altitude Airstart Considerations GE100

Initiate the airstart as soon as possible. After initiating a zoom climb and jettisoning stores (if required), retard the throttle to OFF then advance the throttle to the normal operating range. Place the ENG CONT switch to SEC and turn on the JFS (START 2) to assist the airstart.

Following a zoom climb, plan to arrive at 250 knots until the JFS is preserving rpm; airspeed may then be reduced to achieve maximum range or maximum endurance (200 or 170 knots, respectively, plus 5 knots per 1000 pounds of fuel/store weights over [C] 1000, [D] zero pounds). If a higher airspeed is maintained or an attempt is made to gain airspeed to delay the rpm decay, available time may be reduced to the point that an airstart is not possible.

During any low altitude airstart attempt, constantly evaluate altitude above the ground relative to airstart success. Do not delay ejection below 2000 feet AGL unless the engine is producing thrust capable of maintaining level flight or safely controlling the sink rate or unless a flameout landing can be accomplished.

Airstart Procedures GE100

To begin the airstart sequence, retard the throttle to OFF; then immediately advance the throttle back into the normal operating range, preferably midrange.

NOTE

If the throttle is retarded to OFF to clear a stall, it should be maintained in OFF for a few seconds to allow the stall to clear.

After throttle advance, monitor for signs of a light-off before rpm decays below 50 percent (characterized by a rapid rise in FTIT accompanied by a slow increase in rpm). If rpm and FTIT continue to decay after rpm drops below 50 percent, place the ENG CONT switch to SEC (even if the SEC caution light is illuminated).

If a hot/hung start occurs, retard the throttle to OFF and allow the FTIT to drop to below 700°C before advancing the throttle. Increasing the airspeed (maximum of 400 knots/0.9 mach) should help the next airstart to be cooler. If the condition persists, retard the throttle to OFF, place the ENG CONT switch to SEC, and allow the FTIT to decrease below 700°C before advancing the throttle.

After entering the JFS envelope, start the JFS to assist in preserving rpm. With the JFS preserving rpm, airspeed may be reduced to achieve maximum range/endurance.

If the JFS stops running or fails to run within 30 seconds, do not reattempt a JFS start until the brake/JFS accumulators have had time to recharge. Allow 1 minute of engine rotation (either windmilling or JFS-assisted) at 12 percent rpm or above to insure that the brake/JFS accumulators are fully recharged. Recharging begins 3-4 seconds before the JFS RUN light illuminates or 30 seconds after selecting a start position (in the event of a JFS failure to run). Recharging occurs regardless of JFS switch position.

In the event of a JFS shutdown, the JFS switch does not relatch in either start position while the JFS is spooling down. Spooldown from full governed speed takes approximately 17 seconds. The JFS switch must be cycled to OFF and then START 2 to reinitiate a JFS start. It is possible to complete the spooldown before the brake/JFS accumulators are recharged if the JFS ran for only a short time.

When the airstart is completed and usable thrust is regained, turn the JFS off. Reset the main generator using the ELEC CAUTION RESET button and verify MAIN GEN and STBY GEN lights are off. Cycle the EPU switch to OFF and then back to NORM.

To accomplish an airstart:

1. Throttle – OFF, then midrange.

CAUTION

- FTIT should decrease rapidly when throttle is OFF. If FTIT does not decrease rapidly, verify that the throttle is OFF.
- Do not mistake a rapid initial FTIT increase during an airstart as an indication of a hot start. Typically, airstarts are characterized by rapidly increasing FTIT with a slow increase in rpm.

If a relight does not occur before rpm decays below 50 percent or if below 10,000 feet AGL:

2. ENG CONT switch – SEC (even if SEC caution light is on).
3. Airspeed – Attain approximately 250 knots or establish maximum range or endurance airspeed (200 or 170 knots, respectively, plus 5 knots per 1000 pounds of fuel/store weights over [C] 1000, [D] zero pounds) with JFS preserving rpm.
   Above 30,000 feet MSL, airspeeds in the 250-400 knot/0.9 mach range should be considered to reduce altitude and increase the probability of a successful airstart.

NOTE

If maximum gliding range is not a factor, consider maintaining 250 knots or more above 10,000 feet AGL to provide best restart conditions (in case of JFS failure). Below 10,000 feet AGL with the JFS preserving rpm, maintain maximum range or maximum endurance airspeed.

4. JFS switch – START 2 below 20,000 feet MSL and below 400 knots.

NOTE

- If the JFS switch is erroneously placed to START 1, leave it there.
- If the JFS RUN light does not illuminate or goes off once illuminated, place the JFS switch to OFF and reattempt START 2 when the brake/JFS accumulators are recharged. The JFS switch does not relatch in either start position while the JFS is spooling down.

If engine rpm rolls back or hangs below in-flight idle (approximately 70 percent) and FTIT exceeds 935°C:

5. Throttle – OFF, then midrange.
   Allow FTIT to drop below 700°C before advancing the throttle.
6. Airspeed – Increase (400 knots/0.9 mach maximum).

If hung start/hot start persists:

7. Throttle – OFF.
8. ENG CONT switch – SEC.

NOTE

The proximity of the ENG CONT switch to the JFS switch makes the JFS switch susceptible to being bumped to OFF when selecting SEC.

9. Throttle – Midrange.
   Allow FTIT to drop below 700°C before advancing throttle.

If engine does not respond normally after airstart is completed:

10. Refer to FLAMEOUT LANDING, this section.

If engine responds normally:

10. JFS switch – OFF.

11. ELEC CAUTION RESET button – Depress.
    Verify MAIN GEN and STBY GEN lights are off.

12. EPU switch – OFF, then NORM.

13. ADI – Check for presence of OFF and/or AUX warning flags.
    If warning flag(s) is in view, refer to TOTAL INS FAILURE, this section.

14. Land as soon as possible.

15. Refer to ACTIVATED EPU/HYDRAZINE LEAK, this section.

FLAMEOUT LANDING

NOTE

LESS 61 The HUD is not available if main and standby generators are off line.

The decision to eject or make a flameout landing rests with the pilot. Considerations for attempting a flameout landing must include:

- Nature of the emergency.
- Weather conditions.
- Day or night.
- Proximity of a suitable landing runway.
- Proficiency in performing simulated flameout (SFO) landings.

Due to the capabilities of the ejection seat, the entire approach is within the ejection envelope; however, ejection should not be delayed in an attempt to salvage a questionable approach. When performing a flameout landing, the aircraft can safely stop (dry runway without arresting gear) in approximately twice the computed ground roll distance (8000-foot minimum runway length recommended), assuming a touchdown no more than 1/3 of the way down the runway at 11-13 degrees AOA.

To perform a flameout landing, turn immediately toward the desired runway. Jettison stores and establish maximum range airspeed. Maximum range airspeed may be less than the minimum airstart airspeed. If range to the desired runway is critical, the decision to attempt an airstart or a flameout landing rests with the pilot.

NOTE

- During an airstart attempt, do not slow below the minimum airstart airspeed.
- If the engine is still running, but thrust is insufficient to sustain level flight, treat it as a flameout situation.

Maximum range airspeed varies only with GW and is not affected by drag index. Maximum range airspeed is 200 knots for a GW of 20,000 pounds and increases 5 knots per 1000 pounds of actual GW above 20,000 pounds. For most circumstances, sufficient accuracy is obtained by adding 5 knots per 1000 pounds of fuel/store weights over [C] 1000, [D] zero pounds.

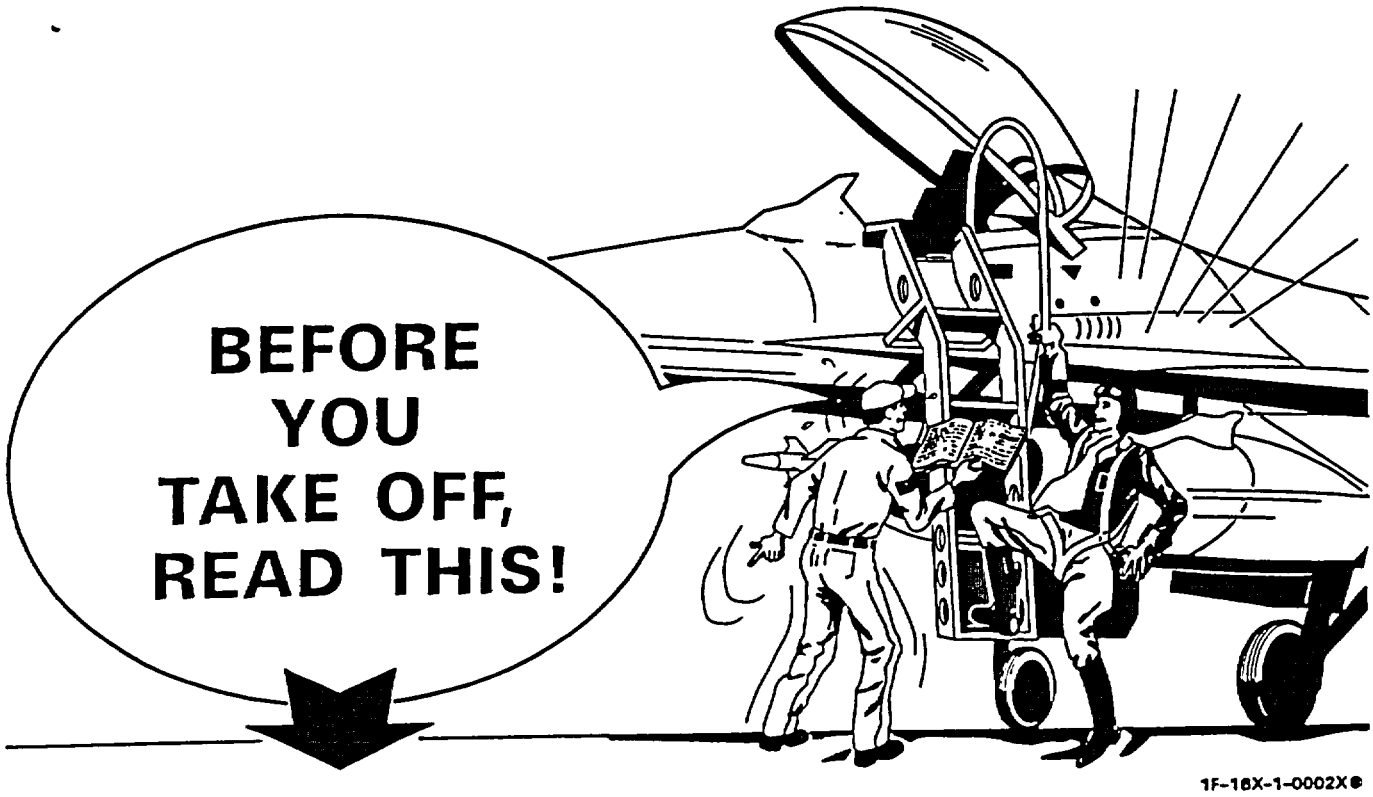
NOTE

- This formula is based on the average aircraft operating weight. Refer to T.O. 1F-16CG-1-1, PART 1, DRAG INDEXES AND WEIGHTS – BASIC AIRCRAFT. If range to desired runway is critical, maximum range airspeed may be calculated using actual GW in excess of 20,000 pounds.
- For a 10,000-foot descent (LG up), each 10 knots above or below maximum range airspeed decreases glide range up to 1/4 nm.

The maximum range airspeed equates to approximately 7 degrees AOA (any GW or drag index) and provides a glide ratio of approximately 7 nm per 5000

Applicant Exhibit MMM.

Following are pages from the Block 40 Manual that contain subject matter corresponding to that shown on pages from the Block 25 Manual included in Applicant Exhibit MMM.



1F-16X-1-0002X●

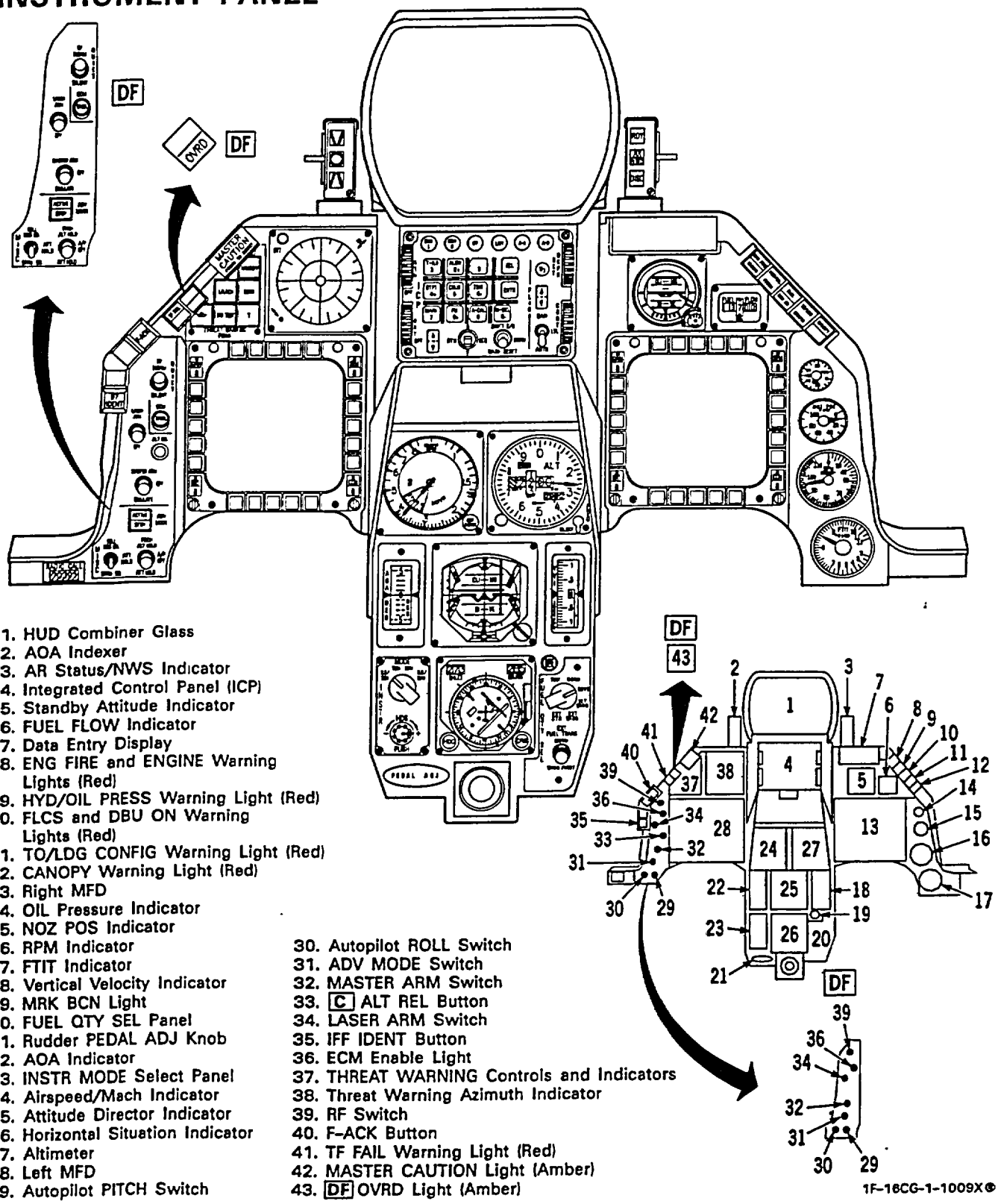
SCOPE

This manual contains the necessary information for safe and efficient operation of the aircraft. These instructions provide a general knowledge of the aircraft and its characteristics and specific normal and emergency operating procedures. Pilot experience is recognized; therefore, basic flight principles are avoided. Instructions in this manual are prepared to be understandable to the least experienced pilot who can be expected to operate the aircraft. This manual provides the best possible operating instructions under most conditions. Multiple emergencies, adverse weather, terrain, etc., may require modification of the procedures. This manual must be used with one or more of the following manuals to obtain information necessary for safe and efficient operation:

T.O. 1F-16CG-1-1	Supplemental Flight Manual, F-16C/D Aircraft
T.O. 1F-16CG-1-2	Supplemental Flight Manual, F-16C/D Aircraft
T.O. 1F-16CG-5-2	Loading Data
T.O. 1F-16CG-6CF-1	Acceptance and Functional Check Flight Procedures Manual, F-16C/D Aircraft
T.O. 1F-16CG-25-1	Nuclear Weapons Delivery Manual (SECRET) (Title Unclassified)
T.O. 1F-16CG-25-10	Aircrew Practice Bomb Delivery Procedures
T.O. 1F-16CG-34-1-1	Avionics and Nonnuclear Weapons Delivery Flight Manual
T.O. 1-1M-44-1FD	Combat Weapons Delivery Software
T.O. 1F-16CG-39	Aircraft Battle Damage Repair
T.O. 1-1C-1	Basic Flight Crew Air Refueling Procedures
T.O. 1-1C-1-30	F-16 Flight Crew Air Refueling Procedures

Cockpit Arrangement [C] [DF] (Typical)

INSTRUMENT PANEL



1. HUD Combiner Glass
2. AOA Indexer
3. AR Status/NWS Indicator
4. Integrated Control Panel (ICP)
5. Standby Attitude Indicator
6. FUEL FLOW Indicator
7. Data Entry Display
8. ENG FIRE and ENGINE Warning Lights (Red)
9. HYD/OIL PRESS Warning Light (Red)
10. FLCS and DBU ON Warning Lights (Red)
11. TO/LDG CONFIG Warning Light (Red)
12. CANOPY Warning Light (Red)
13. Right MFD
14. OIL Pressure Indicator
15. NOZ POS Indicator
16. RPM Indicator
17. FTIT Indicator
18. Vertical Velocity Indicator
19. MRK BCN Light
20. FUEL QTY SEL Panel
21. Rudder PEDAL ADJ Knob
22. AOA Indicator
23. INSTR MODE Select Panel
24. Airspeed/Mach Indicator
25. Attitude Director Indicator
26. Horizontal Situation Indicator
27. Altimeter
28. Left MFD
29. Autopilot PITCH Switch
30. Autopilot ROLL Switch
31. ADV MODE Switch
32. MASTER ARM Switch
33. [C] ALT REL Button
34. LASER ARM Switch
35. IFF IDENT Button
36. ECM Enable Light
37. THREAT WARNING Controls and Indicators
38. Threat Warning Azimuth Indicator
39. RF Switch
40. F-ACK Button
41. TF FAIL Warning Light (Red)
42. MASTER CAUTION Light (Amber)
43. [DF] OVRD Light (Amber)

Figure 1-3. (Sheet 4)

Applicant Exhibit OOO.

Following are pages from the Block 40 Manual that contain subject matter corresponding to that shown on pages from the Block 25 Manual included in Applicant Exhibit OOO.

HYD PRESS Indicators and Warning Light (Typical)

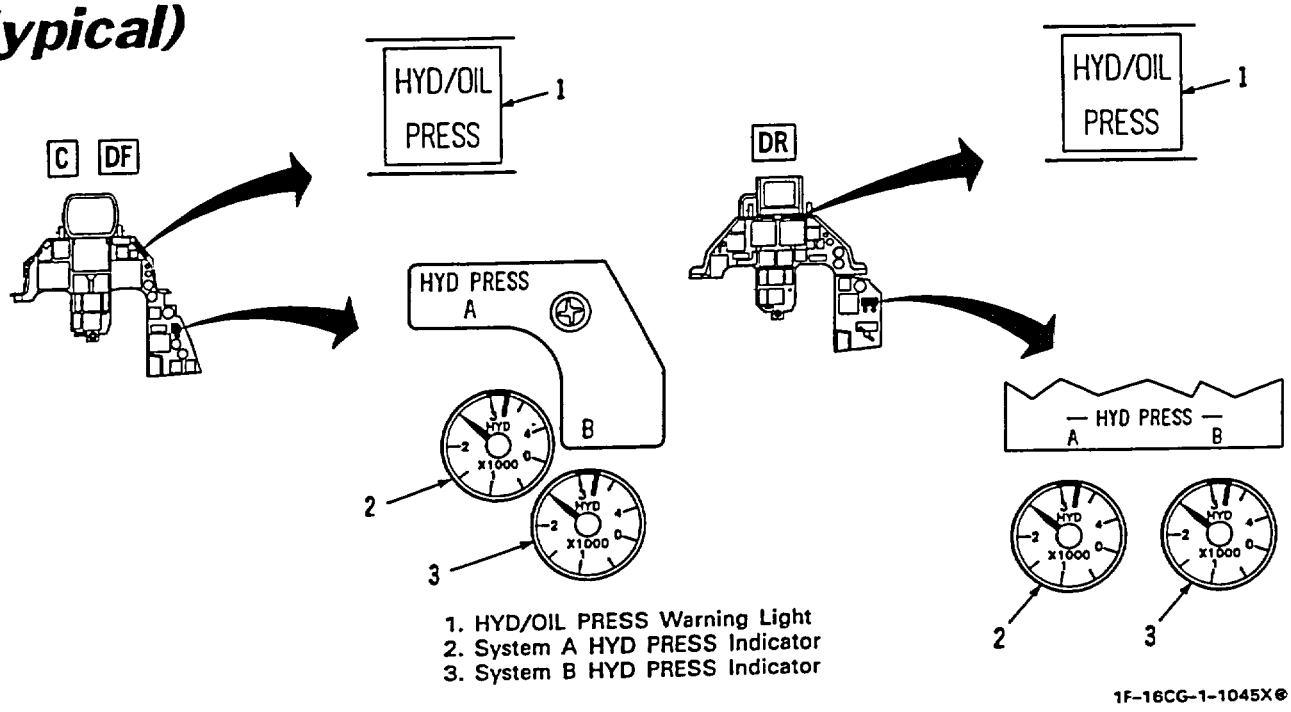


Figure 1-34.

Hydrazine Leak Detector

The hydrazine leak detector is a silicone base, mustard yellow disc visible through access door 3208. The viewing area is black on one half to provide contrast with the mustard yellow disc. The mustard yellow turns purple/black in the presence of hydrazine and/or its vapors, indicating a leak in the EPU and/or fuel tank system.

EPU Fired Indicator

The EPU fired indicator is located next to the EPU ground safety switch on the right side of the engine inlet. Normally, the indicator displays a gray and black disc. If the EPU has been activated, the indicator displays six equally spaced black and white triangles.

EPU OPERATION

The EPU is designed to operate automatically for main and standby generator failure, dual hydraulic system failure, PTO shaft or ADG failure, and engine flameout or if the engine is shut down in flight. The EPU can also be activated manually. After receiving any start command, the EPU requires approximately 2 seconds to come up to speed.

EPU startup may not be audible. Once operating, however, the EPU may be heard but will not sound the same as during the EPU ground check. A lack of sound during EPU startup does not indicate lack of EPU operation which must be confirmed by monitoring the EPU run light. EPU rpm is controlled by three speed controls. The primary and secondary speed controls are based on EPU rpm. The tertiary speed control is based on EPU PMG frequency.

When the EPU is operating, engine thrust settings should be maintained to prevent using hydrazine. This normally requires a minimum of PW220 75-80, GE100 82-90 percent rpm depending on pressure altitude.

If the engine fails, hydrazine alone is used to power the EPU. With hydrazine only, operating time of the system is approximately 10 minutes under normal load requirements. Increased flight control movement reduces this operating time. When the EPU is the sole source of hydraulic power, EPU loss results in loss of aircraft control. Refer to SERVICING DIAGRAM, this section, for servicing/specifications information.

Applicant Exhibit PPP.

Following are pages from the Block 40 Manual that contain subject matter corresponding to that shown on pages from the Block 25 Manual included in Applicant Exhibit PPP.

3. Airspeed – 500 knots maximum.

4. AIR SOURCE knob – OFF (10-15 seconds), then NORM.

If cockpit pressure is not regained but all other systems dependent on the ECS are operational:

5. Flight may be continued below 25,000 feet.

If ECS has failed or cockpit temperature control is not regained:

5. AIR SOURCE knob – OFF.

6. AIR SOURCE knob – RAM (after cockpit is depressurized).

NOTE

External fuel cannot be transferred in OFF or RAM. Consider jettisoning tanks to decrease drag if range is critical and ECS cannot be turned on for short periods of time to transfer fuel.

7. Nonessential electrical equipment – Off.

NOTE

If in VMC and the ADI and HSI are not required for flight, the INS should be considered nonessential.

8. Land as soon as practical.

9. Check for failed emergency dc bus(es). Refer to EMERGENCY POWER DISTRIBUTION, this section.

EQUIP HOT CAUTION LIGHT

If EQUIP HOT caution light illuminates:

NOTE

- Certain ECS equipment malfunctions result in temporary shutdown of the ECS and illumination of the EQUIP HOT caution light.
- An ECS shutdown and EQUIP HOT caution light illumination for up to 2 minutes can occur either during extended LG down flight between sea level and 7000 feet MSL or during operation above a line from 42,000 feet MSL at 0.2 mach to 50,000 feet MSL at 0.95 mach. These ECS shutdowns are normal, but may still require additional action if the EQUIP HOT light remains on for more than 1 minute.
- If cockpit temperature is excessive, refer to COCKPIT PRESSURE/TEMPERATURE MALFUNCTION, this section.

1. AIR SOURCE knob – Confirm in NORM if smoke or fumes are not present.

2. Throttle – 80 percent rpm minimum (in flight).

If EQUIP HOT caution light remains on after 1 minute:

3. Nonessential avionics – Off.

NOTE

If in VMC and the ADI and HSI are not required for flight, the INS should be considered nonessential.

4. Land as soon as practical.

EJECTION

Ejection should be accomplished at the lowest practical airspeed.

WARNING

- When in a spin/deep stall or other uncontrolled flight, eject at least 6000 feet AGL whenever possible. This is the minimum altitude to initiate ejection with minimal risk of injury under the most adverse conditions. The decision to eject must have been made prior to this altitude. Delaying ejection below this altitude may result in serious injury or death.
- Under controlled flight conditions, eject at least 2000 feet AGL whenever possible. If below 2000 feet AGL, attempt to gain altitude if airspeed permits. Do not delay ejection below 2000 feet AGL for any reason which may commit you to unsafe ejection.

WARNING

- Failure to monitor sink rate and height above terrain while performing an airstart or applying low thrust recovery procedures can result in an ejection outside the ejection seat performance envelope.
- Increased potential for injury due to drogue parachute opening shock exists for ejection above 420 knots. The risk of injury at higher airspeeds increases significantly for body weights less than 140 pounds (below the ACES II ejection seat design range of 140-211 pounds).
- Wind blast will exert medium force on the body up to 450 knots, severe forces causing flailing and skin injuries between 450-600 knots, and excessive force above 600 knots.
- During high altitude ejections (mode 3), automatic pilot/seat separation and recovery parachute deployment occur between 16,000-14,500 feet MSL. If high terrain is a factor, manual seat separation procedures must be used to bypass the automatic sequence.

To eject, grasp ejection handle using a two-handed grip with thumb and at least two fingers of each hand. Pull up on handle and continue holding until pilot/seat separation. The ejection handle does not separate from the seat.

Refer to figure 3-5 for manual seat separation and manual survival equipment deployment.

Ejection (Immediate)

1. Ejection handle – Pull.

Ejection (Time Permitting)

If time permits, descend to avoid the hazards of high altitude ejection. Stow all loose equipment and direct the aircraft away from populated areas. Sit with head against headrest, buttocks against back of seat, and feet on rudder pedals.

1. IFF MASTER knob – EMER.
2. MASTER ZEROIZE switch (combat status) – ZEROIZE.
3. Loose equipment and checklist – Stow.
4. Lapbelt and helmet chin strap – Tighten.
5. Night vision devices – Remove (if appropriate).
6. Visor – Down.
7. Throttle – IDLE.
   Slow to lowest practical airspeed.
8. Assume ejection position.
9. Ejection handle – Pull.

Failure of Canopy To Separate

If canopy fails to separate, remain in position for ejection while keeping arms inboard and perform the following:

WARNING

If canopy is jettisoned or manually released/opened after pulling the ejection handle, the ejection seat functions immediately after canopy separation. Be prepared to immediately put arm back in ejection position when the canopy starts to separate.

1. Canopy – Open normally.
2. Canopy – Jettison.

WARNING

Pulling the CANOPY JETTISON T-handle other than straight out may cause the handle to jam.

3. MANUAL CANOPY CONTROL handcrank – Push in and rotate ccw.

WARNING

Use of the CANOPY JETTISON T-handle or MANUAL CANOPY CONTROL handcrank may result in serious injury. To minimize chances of injury, immediately release the handle when the canopy starts to separate.

Ejection Seat Failure

If the ejection seat fails to function after the ejection handle is pulled and the canopy has separated from the aircraft, there are no provisions designed into the escape system for manual bailout.

DITCHING

Ditch the aircraft only as a last resort. All attempts to eject should be accomplished prior to ditching.

Applicant Exhibit 246.

Following are pages from the Block 40 Manual that contain subject matter corresponding to that shown on pages from the Block 25 Manual included in Applicant Exhibit 246.

T.O. 1F-16CG-1

FLIGHT MANUAL

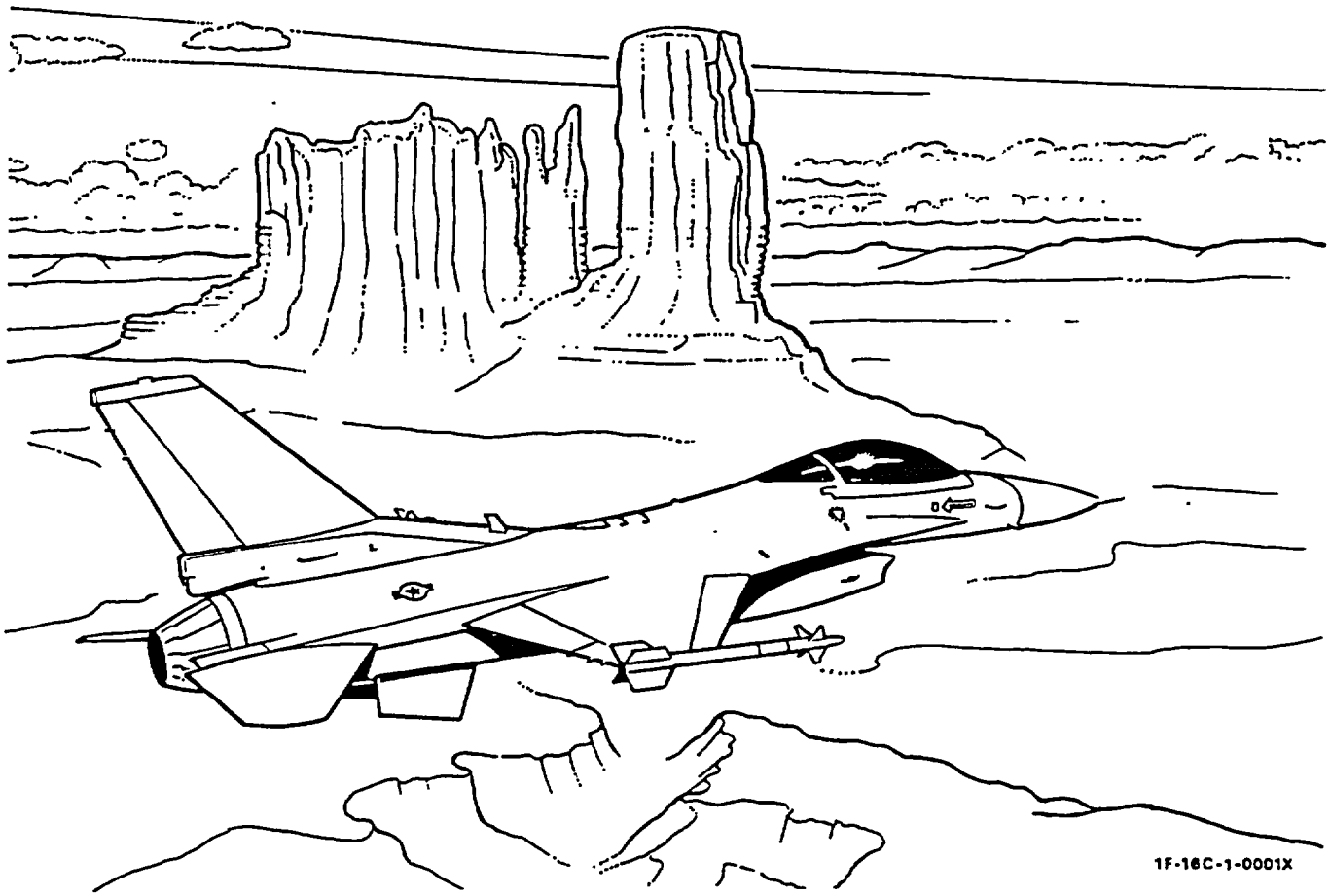
USAF SERIES AIRCRAFT

F-16C/D

BLOCKS 40 AND 42

LOCKHEED MARTIN CORPORATION

F33657-84-C-0247
F42620-95-D-0177



1F-16C-1-0001X

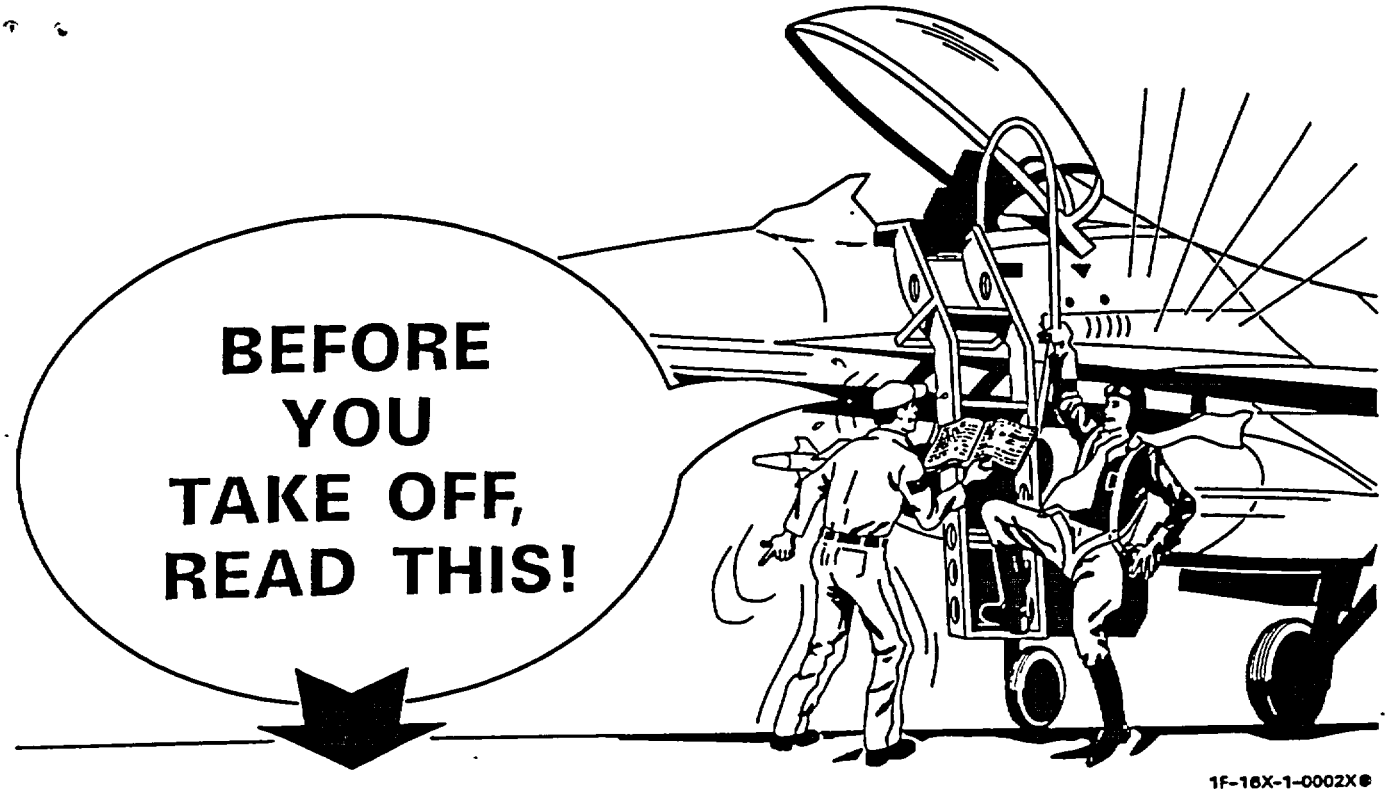
Commanders are responsible for bringing this publication to the attention of all Air Force personnel cleared for operation of subject aircraft.

Published under authority of the Secretary of the Air Force.

NAVY • 2 Oct 97 • 3376

27 MAY 1996
CHANGE 2 8 SEPTEMBER 1997

UT-49949



1F-16X-1-0002X●

SCOPE

This manual contains the necessary information for safe and efficient operation of the aircraft. These instructions provide a general knowledge of the aircraft and its characteristics and specific normal and emergency operating procedures. Pilot experience is recognized; therefore, basic flight principles are avoided. Instructions in this manual are prepared to be understandable to the least experienced pilot who can be expected to operate the aircraft. This manual provides the best possible operating instructions under most conditions. Multiple emergencies, adverse weather, terrain, etc., may require modification of the procedures. This manual must be used with one or more of the following manuals to obtain information necessary for safe and efficient operation:

T.O. 1F-16CG-1-1	Supplemental Flight Manual, F-16C/D Aircraft
T.O. 1F-16CG-1-2	Supplemental Flight Manual, F-16C/D Aircraft
T.O. 1F-16CG-5-2	Loading Data
T.O. 1F-16CG-6CF-1	Acceptance and Functional Check Flight Procedures Manual, F-16C/D Aircraft
T.O. 1F-16CG-25-1	Nuclear Weapons Delivery Manual (SECRET) (Title Unclassified)
T.O. 1F-16CG-25-10	Aircrew Practice Bomb Delivery Procedures
T.O. 1F-16CG-34-1-1	Avionics and Nonnuclear Weapons Delivery Flight Manual
T.O. 1-1M-44-1FD	Combat Weapons Delivery Software
T.O. 1F-16CG-39	Aircraft Battle Damage Repair
T.O. 1-1C-1	Basic Flight Crew Air Refueling Procedures
T.O. 1-1C-1-30	F-16 Flight Crew Air Refueling Procedures

PERMISSIBLE OPERATIONS

The flight manual takes a positive approach and normally states only what can be done. Unusual operations or configurations are prohibited unless specifically covered herein. Clearance must be obtained before any questionable operation which is not specifically permitted in this manual is attempted.

HOW TO BE ASSURED OF HAVING LATEST DATA

Refer to T.O. 0-1-1-4 for a listing of all current flight manuals, safety supplements, operational supplements, and checklists. Also, check the flight manual title page, the title block of each safety and operational supplement, and all status pages contained in the flight manual or attached to formal safety and operational supplements. Clear all discrepancies before flight.

ARRANGEMENT

The manual is divided into seven sections and two supplemental appendices.

ILLUSTRATIONS

Cockpit arrangement, cockpit console, and cockpit instrument panel illustrations display the delivered configuration plus the approved equipment modifications. For details of equipment modification, see the individual equipment illustration.

SUPPLEMENT INFORMATION AND GUIDELINES

Supplements are safety or operational and are indicated -1SS or -1S, respectively. Supplements are issued as interim electronic messages or formal printed copies. All interim supplements are assigned odd numbers, such as -1SS-195. When an interim supplement is formalized, it is assigned the next following even number, such as -1SS-196. Formal supplements not preceded by an interim supplement are also assigned even numbers. If an interim supplement is not to be formalized, a statement cancelling the next assigned even supplement number is included in the REMARKS section of the interim supplement. If a formal supplement is not preceded by an interim supplement, a statement cancelling the previous odd supplement number is included on the status page of the formal supplement. Occasionally, a supplement has dual references in the instructions; this is because the supplement applies to the present and subsequent manual. Minor text/illustration changes or deletions are given as instructions in the supplement. When lengthy additions are required, the formal supplement provides one-sided insert page(s) to the flight manual and checklist. This supplement page(s) is attached to the original page(s). The original page(s) remains in the manual or checklist in case the supplement is rescinded and the page(s) is needed. Added page(s) (e.g., 3-48.1) are inserted in proper numerical sequence and may be printed on both sides.

SAFETY SUPPLEMENTS

Information involving safety is promptly forwarded in a safety supplement. Urgent information is published in interim safety supplements and transmitted by electronic message. Formal supplements are mailed. The supplement title block and status page (published with formal supplements only) should be checked to determine the effect of the supplement on this manual and other outstanding supplements.

OPERATIONAL SUPPLEMENTS

Information involving changes to operating procedures is forwarded by operational supplements. The procedure for handling operational supplements is the same as for safety supplements.

CHECKLIST

The checklist contains itemized procedures without all of the amplification. Primary line items in the flight manual and checklist are identical.

HOW TO GET PERSONAL COPIES

Each pilot is entitled to a personal copy of the flight manual, safety supplements, operational supplements, and a checklist. The required quantities should be ordered before needed to assure their timely receipt. Check with the publication distribution officer whose job is to fulfill T.O. requests. Basically, the required quantities must be ordered from the appropriate T.O. Index. T.O. 00-5-1 and T.O. 00-5-2 give detailed information for properly ordering these publications. Insure a system is established at each base to deliver the publications to the pilots immediately upon receipt.

FLIGHT MANUAL BINDERS

Looseleaf binders and sectionalized tabs are available for use with the manual. They are obtained through local purchase procedures and are listed in the Federal Supply Schedule (FSC Group 75, Office Supplies, Part I). Check with supply personnel for assistance in procuring these items.

CHANGE SYMBOL

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

WARNINGS, CAUTIONS, AND NOTES

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

WARNING

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

CAUTION

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

NOTE

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

USE OF WORDS SHALL, WILL, SHOULD, AND MAY

The word shall or will is used to indicate a mandatory requirement. The word should is used to indicate a nonmandatory desired or preferred method of accomplishment. The word may is used to indicate an acceptable or suggested means of accomplishment.

USE OF WORDS AS DESIRED AND AS REQUIRED

As desired allows pilot preference in switch/control positioning.

As required indicates those actions which vary based on mission requirements.

AIRSPEED REFERENCES

All references to airspeed quoted in knots refer to indicated airspeed.

PILOT'S 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 safety investigation and flight test reports assure inclusion of the latest data in the manual. Comments, corrections, and questions regarding this manual or any phase of the flight manual program are welcomed. These should be forwarded on AF Form 847 in accordance with AFI 11-215 through command headquarters to ASC/YPT, 1981 Monahan Way, Wright-Patterson AFB, OH 45433-7205.

PUBLICATION DATE

The date appearing on the title page represents the currency of material contained herein.

AIRCRAFT AND COCKPIT DESIGNATION CODES

System and/or component effectivity for a particular aircraft version/cockpit is denoted by a letter code enclosed in a box located in the text or on an illustration. The symbols and designations are as follows:

No code – F-16C and F-16D aircraft

[C] F-16C aircraft

[D] F-16D aircraft

[DF] F-16D aircraft, forward cockpit

[DR] F-16D aircraft, rear cockpit

ENGINE DESIGNATION CODES

System and/or component effectivity for a particular engine version is denoted by an engine code enclosed in a box located in the text or on an illustration. The symbols and designations are as follows:

No code – Any engine

[PW220] F100-PW-220

[GE100] F110-GE-100

3. Airspeed – 500 knots maximum.

4. AIR SOURCE knob – OFF (10-15 seconds), then NORM.

If cockpit pressure is not regained but all other systems dependent on the ECS are operational:

5. Flight may be continued below 25,000 feet.

If ECS has failed or cockpit temperature control is not regained:

5. AIR SOURCE knob – OFF.

6. AIR SOURCE knob – RAM (after cockpit is depressurized).

NOTE

External fuel cannot be transferred in OFF or RAM. Consider jettisoning tanks to decrease drag if range is critical and ECS cannot be turned on for short periods of time to transfer fuel.

7. Nonessential electrical equipment – Off.

NOTE

If in VMC and the ADI and HSI are not required for flight, the INS should be considered nonessential.

8. Land as soon as practical.

9. Check for failed emergency dc bus(es). Refer to EMERGENCY POWER DISTRIBUTION, this section.

EQUIP HOT CAUTION LIGHT

If EQUIP HOT caution light illuminates:

NOTE

- Certain ECS equipment malfunctions result in temporary shutdown of the ECS and illumination of the EQUIP HOT caution light.
- An ECS shutdown and EQUIP HOT caution light illumination for up to 2 minutes can occur either during extended LG down flight between sea level and 7000 feet MSL or during operation above a line from 42,000 feet MSL at 0.2 mach to 50,000 feet MSL at 0.95 mach. These ECS shutdowns are normal, but may still require additional action if the EQUIP HOT light remains on for more than 1 minute.
- If cockpit temperature is excessive, refer to COCKPIT PRESSURE/TEMPERATURE MALFUNCTION, this section.

1. AIR SOURCE knob – Confirm in NORM if smoke or fumes are not present.

2. Throttle – 80 percent rpm minimum (in flight).

If EQUIP HOT caution light remains on after 1 minute:

3. Nonessential avionics – Off.

NOTE

If in VMC and the ADI and HSI are not required for flight, the INS should be considered nonessential.

4. Land as soon as practical.

EJECTION

Ejection should be accomplished at the lowest practical airspeed.

WARNING

- When in a spin/deep stall or other uncontrolled flight, eject at least 6000 feet AGL whenever possible. This is the minimum altitude to initiate ejection with minimal risk of injury under the most adverse conditions. The decision to eject must have been made prior to this altitude. Delaying ejection below this altitude may result in serious injury or death.
- Under controlled flight conditions, eject at least 2000 feet AGL whenever possible. If below 2000 feet AGL, attempt to gain altitude if airspeed permits. Do not delay ejection below 2000 feet AGL for any reason which may commit you to unsafe ejection.

WARNING

- Failure to monitor sink rate and height above terrain while performing an airstart or applying low thrust recovery procedures can result in an ejection outside the ejection seat performance envelope.
- Increased potential for injury due to drogue parachute opening shock exists for ejection above 420 knots. The risk of injury at higher airspeeds increases significantly for body weights less than 140 pounds (below the ACES II ejection seat design range of 140-211 pounds).
- Wind blast will exert medium force on the body up to 450 knots, severe forces causing flailing and skin injuries between 450-600 knots, and excessive force above 600 knots.
- During high altitude ejections (mode 3), automatic pilot/seat separation and recovery parachute deployment occur between 16,000-14,500 feet MSL. If high terrain is a factor, manual seat separation procedures must be used to bypass the automatic sequence.

To eject, grasp ejection handle using a two-handed grip with thumb and at least two fingers of each hand. Pull up on handle and continue holding until pilot/seat separation. The ejection handle does not separate from the seat.

Refer to figure 3-5 for manual seat separation and manual survival equipment deployment.

Ejection (Immediate)

1. Ejection handle – Pull.

Ejection (Time Permitting)

If time permits, descend to avoid the hazards of high altitude ejection. Stow all loose equipment and direct the aircraft away from populated areas. Sit with head against headrest, buttocks against back of seat, and feet on rudder pedals.

1. IFF MASTER knob – EMER.
2. MASTER ZEROIZE switch (combat status) – ZEROIZE.
3. Loose equipment and checklist – Stow.
4. Lapbelt and helmet chin strap – Tighten.
5. Night vision devices – Remove (if appropriate).
6. Visor – Down.
7. Throttle – IDLE.
   Slow to lowest practical airspeed.
8. Assume ejection position.
9. Ejection handle – Pull.

Failure of Canopy To Separate

If canopy fails to separate, remain in position for ejection while keeping arms inboard and perform the following:

WARNING

If canopy is jettisoned or manually released/opened after pulling the ejection handle, the ejection seat functions immediately after canopy separation. Be prepared to immediately put arm back in ejection position when the canopy starts to separate.

1. Canopy – Open normally.
2. Canopy – Jettison.

WARNING

Pulling the CANOPY JETTISON T-handle other than straight out may cause the handle to jam.

3. MANUAL CANOPY CONTROL handcrank – Push in and rotate ccw.

WARNING

Use of the CANOPY JETTISON T-handle or MANUAL CANOPY CONTROL handcrank may result in serious injury. To minimize chances of injury, immediately release the handle when the canopy starts to separate.

Ejection Seat Failure

If the ejection seat fails to function after the ejection handle is pulled and the canopy has separated from the aircraft, there are no provisions designed into the escape system for manual bailout.

DITCHING

Ditch the aircraft only as a last resort. All attempts to eject should be accomplished prior to ditching.