USAF SERIES

T-38A (NASA)

AIRCRAFT

SUPPLEMENTAL FLIGHT MANUAL

SEE TECHNICAL ORDER INDEX T.O. 0-1-1-5 AND SUPPLEMENTS THERETO FOR CURRENT STATUS OF TRAINER AIRCRAFT FLIGHT MANUALS, SAFETY AND OPERATIONAL SUPPLEMENTS, AND FLIGHT CREW CHECKLISTS

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THIS PUBLICATION SUPPLEMENTS BASIC T.O. 1T-38A-1, TO COVER T-38A AIRCRAFT OPERATED BY NASA.

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1 OCTOBER 1967
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CURRENT FLIGHT CREW CHECKLIST

1T-38A-1CL-1-1
1 OCTOBER 1967
CHANGE 3 – 15 MAY 1970

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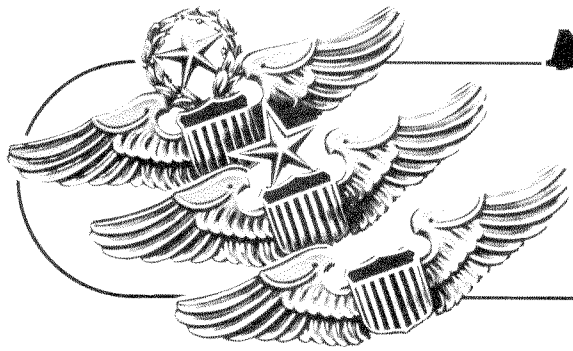

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* REFER TO BASIC FLIGHT MANUAL, T.O. 1T-38A-1.

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FOREWORD

The purpose of this publication is to provide additional information peculiar to the T-38A aircraft operated by NASA (National Aeronautics and Space Administration) and includes only the systems, equipment, and procedures which directly differ in configuration from the standard T-38A aircraft. Instructions and illustrations in this publication and in the basic T.O. 1T-38A-1 provide all the information necessary for safe and efficient operation of the T-38A (NASA) aircraft.

The Air Force serial numbers of the aircraft included in this supplement are as follows:

AF61-912
AF63-8193, AF63-8200, and AF63-8204
AF65-10326 thru AF65-10329
AF65-10351 thru AF65-10357
AF66-8354 and AF66-8355
AF66-8381 thru AF66-8387
AF67-14825

DESCRIPTION

SECTION I

T-38A 1-100

THE AIRCRAFT.

This aircraft, produced by Northrop Corporation, Aircraft Division, is a two-place, twin-turbojet, supersonic trainer. Each cockpit contains an individual jettisonable canopy and ejection seat. A cabin air-conditioning and pressurization system conditions and pressurizes the air in both cockpits. The fuselage is an area rule (coke bottle), with moderately sweptback wings and empennage. Each engine air intake (inlet) duct is equipped with an electrical heating blanket for heating each inlet duct lip surface. The aircraft is equipped with an all-movable horizontal tail. A speed brake is located at the lower center fuselage. The tricycle landing gear has a steerable nosewheel. All flight control surfaces are fully powered by two independent hydraulic systems. There are no provisions for external stores.

COCKPIT ARRANGEMENT — FRONT (TYPICAL)

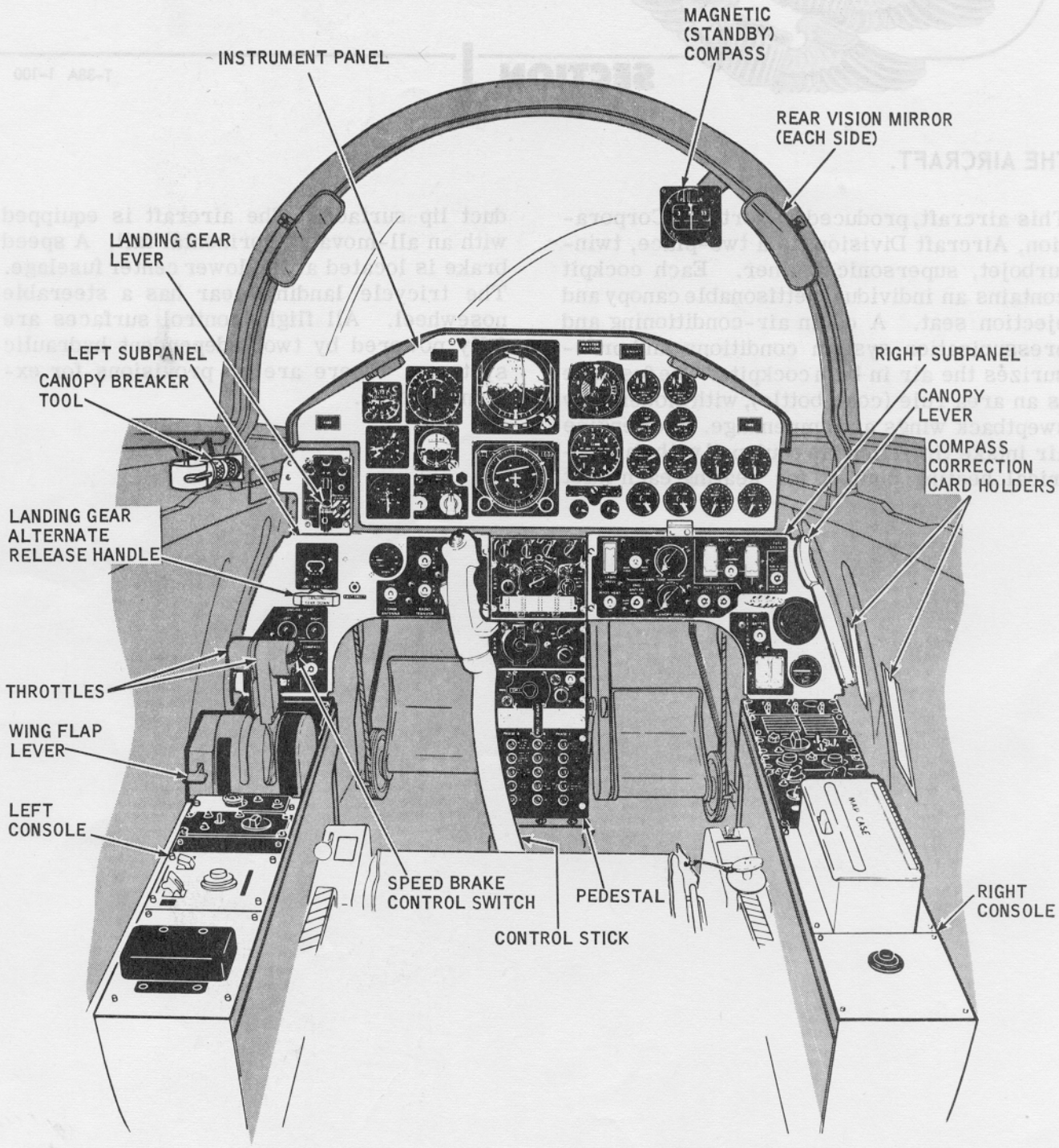


Figure 1-1.

SUBPANELS—FRONT COCKPIT (TYPICAL)

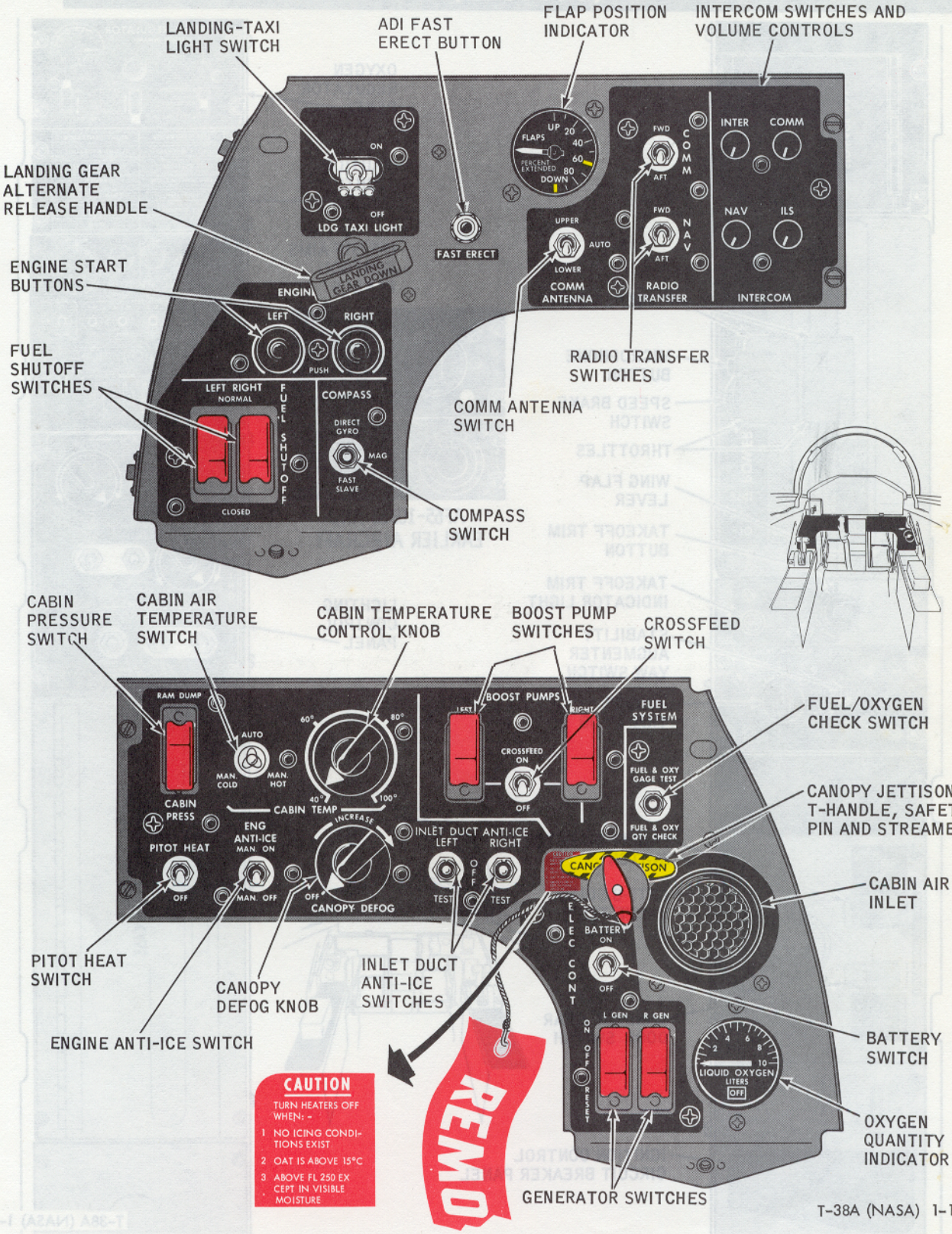


Figure 1–2.

CONSOLE PANELS – FRONT COCKPIT (TYPICAL)

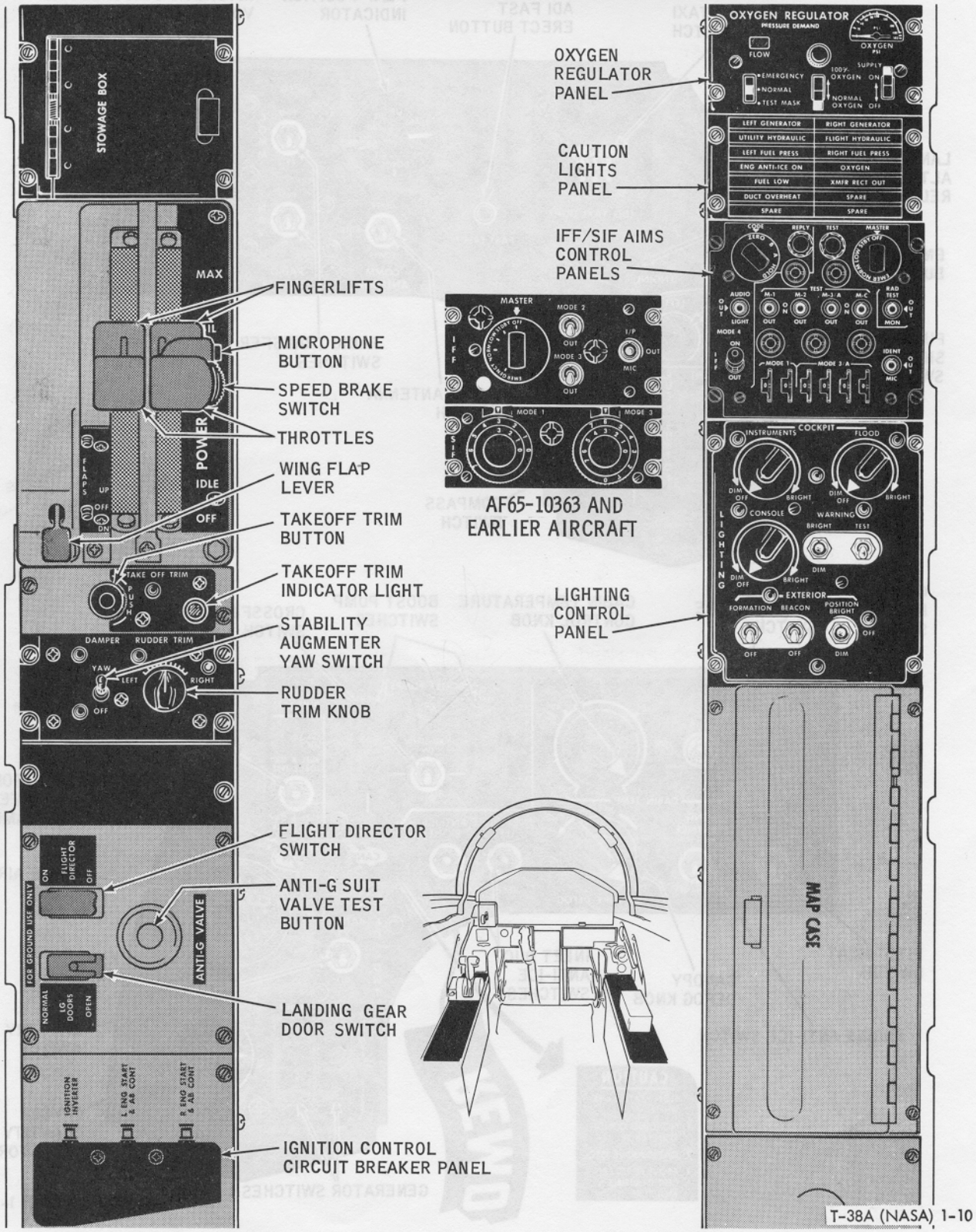


Figure 1–3.

CONSOLE PANELS – REAR COCKPIT (TYPICAL)

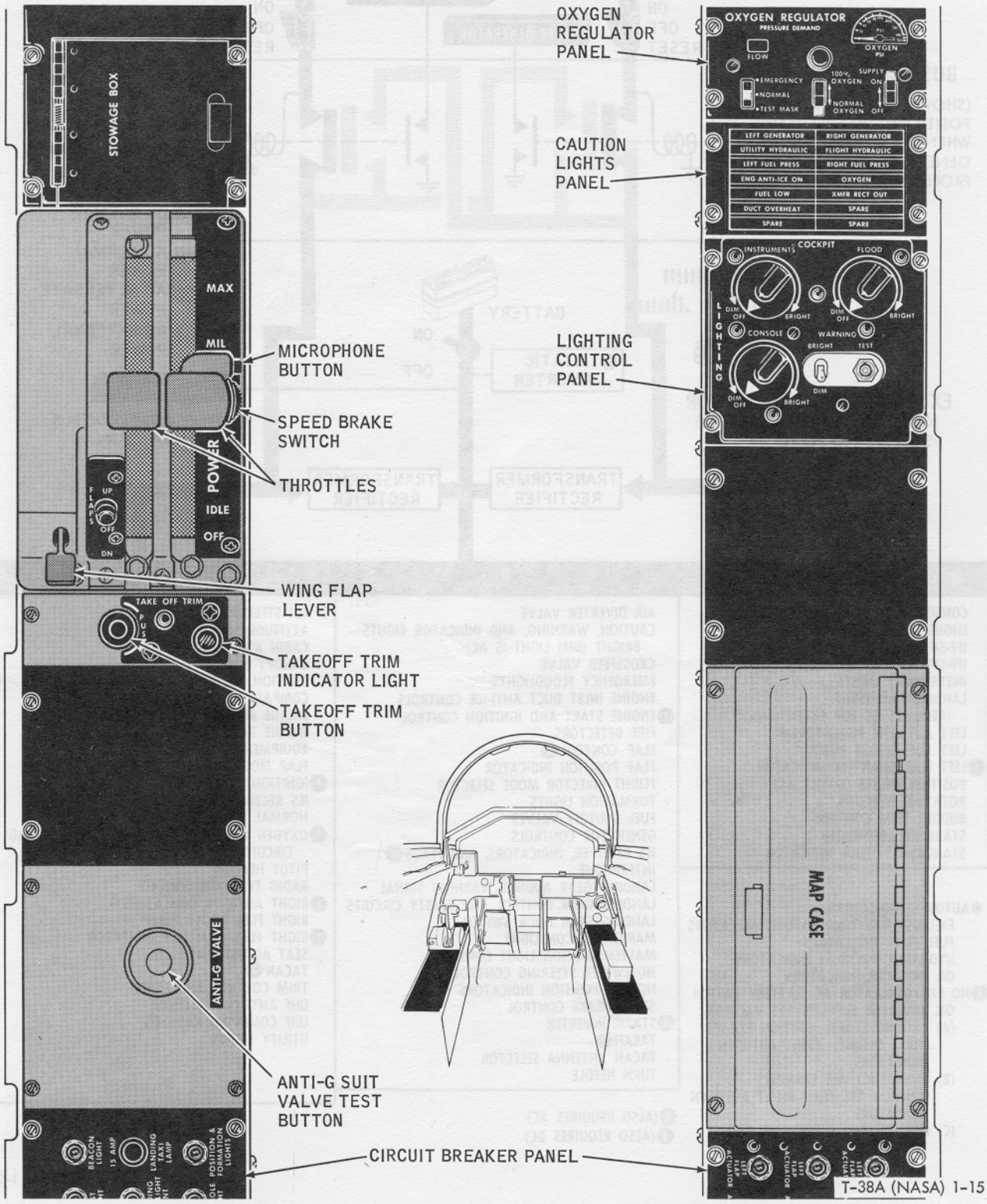
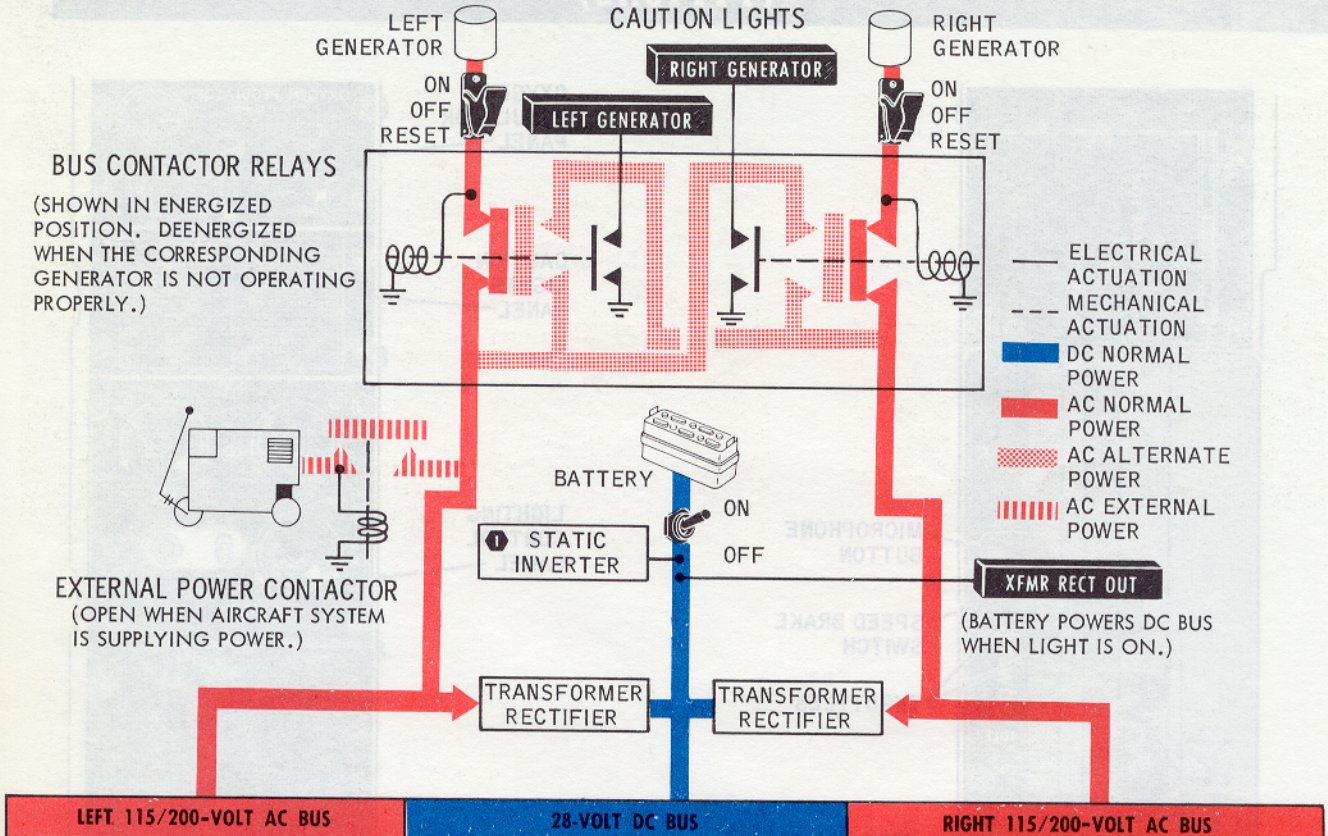


Figure 1–4.

ELECTRICAL SYSTEM



LEFT 115/200-VOLT AC BUS

- CONSOLE LIGHTS
- ENGINE INLET DUCT ANTI-ICE
- IFF-SIF
- IFF-SIF, AIMS (SOME AIRCRAFT)
- INSTRUMENT LIGHTS
- LANDING-TAXI LIGHT (REQUIRES DC FOR EXTENSION)
- LEFT AUTOSYN INDICATORS*
- LEFT FUEL BOOST PUMP
- 1 LEFT FUEL QUANTITY INDICATOR
- POSITION LIGHTS (6-VOLT AC)
- ROTATING BEACONS
- RUDDER TRIM CONTROL
- STABILITY AUGMENTER
- STANDBY ATTITUDE INDICATOR

28-VOLT DC BUS

- AIR DIVERTER VALVE
- CAUTION, WARNING, AND INDICATOR LIGHTS—BRIGHT (DIM LIGHT IS AC)
- CROSSFEED VALVE
- EMERGENCY FLOODLIGHTS
- ENGINE INLET DUCT ANTI-ICE CONTROLS
- 1 ENGINE START AND IGNITION CONTROL
- FIRE DETECTORS
- FLAP CONTROL 2
- FLAP POSITION INDICATOR
- FLIGHT DIRECTOR MODE SELECTOR
- FORMATION LIGHTS
- FUEL SHUTOFF VALVES
- GENERATOR CONTROLS
- ILS RECEIVER, INDICATORS, AND FLAGS 2
- INTERPHONE
- LANDING GEAR AUDIBLE WARNING SIGNAL
- LANDING GEAR CONTROL AND SAFETY CIRCUITS
- LANDING GEAR DOOR SWITCH
- MARKER BEACON LIGHT
- MASTER CAUTION LIGHT CONTROL
- NOSEWHEEL STEERING CONTROL
- NOZZLE POSITION INDICATORS
- SPEED BRAKE CONTROL
- 1 STATIC INVERTER
- TACAN 2
- TACAN ANTENNA SELECTOR
- TURN NEEDLE

RIGHT 115/200-VOLT AC BUS

- ADI STEERING BARS 3
- ATTITUDE SPHERE 3
- CABIN AIR-CONDITIONING
- CANOPY SEAL
- CAUTION, WARNING AND INDICATOR LIGHTS — DIM
- COMPASS CARD AND BEARING POINTER 3
- ENGINE ANTI-ICE
- ENGINE INLET DUCT ANTI-ICE
- EQUIPMENT COMPARTMENT COOLING
- FLAP MOTORS
- 1 IGNITION EXCITERS 3
- ILS RECEIVER, INDICATORS, AND FLAGS 3
- NORMAL FLOODLIGHTS
- 1 OXYGEN QUANTITY AND LOW-LEVEL WARNING CIRCUIT
- PITOT HEATER
- RADIO TRANSFER CONTROL
- 1 RIGHT AUTOSYN INDICATORS*
- RIGHT FUEL BOOST PUMP
- 1 RIGHT FUEL QUANTITY INDICATOR
- SEAT ADJUSTMENT
- TACAN 3
- TRIM CONTROL AND LIGHT
- UHF ANTENNA SELECTOR
- UHF COMMAND RADIO 3
- UTILITY LIGHTS

*AUTOSYN INDICATORS:
- EXHAUST GAS TEMPERATURE INDICATORS
- FUEL FLOW INDICATORS
- HYDRAULIC PRESSURE INDICATORS
- OIL PRESSURE INDICATORS

1 NO EXT/GENERATOR AC, BATTERY SWITCH ON, INVERTER SUPPLIES 115 VAC FOR:
- (A) GROUND START: IGNITION EXCITER (FIRST ENGINE)—RIGHT AUTOSYN INDICATORS
- (B) EMERGENCY AIR STARTS: IGNITION EXCITERS—RIGHT AUTOSYN INDICATORS
- (C) FUEL/OXYGEN QUANTITIES AND TEST-CHECK SWITCH OPERATED.

2 (ALSO REQUIRES AC)
3 (ALSO REQUIRES DC)

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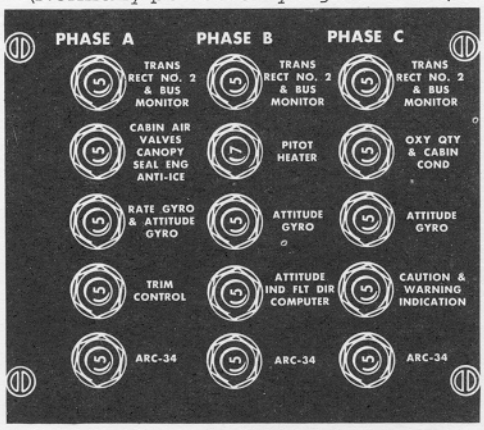
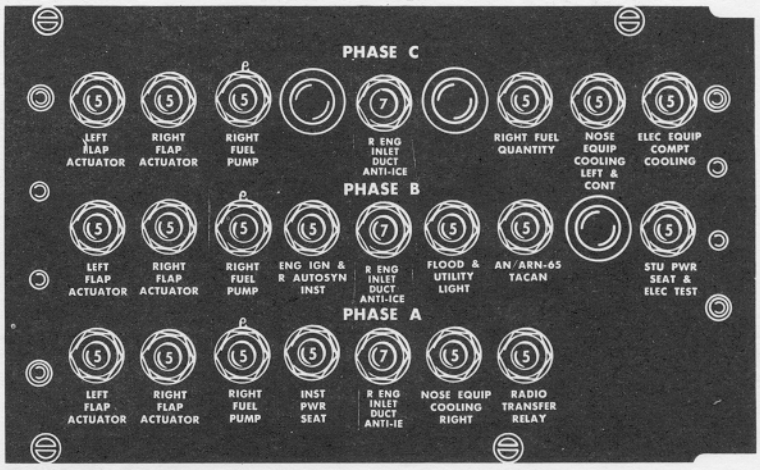
Figure 1-5.

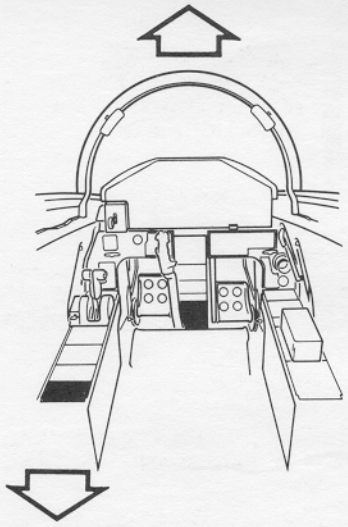
CIRCUIT BREAKER PANELS (TYPICAL)

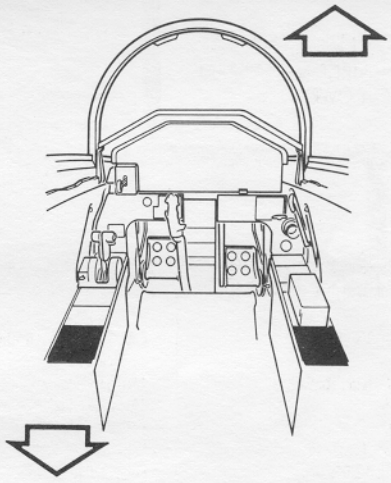
PEDESTAL — FRONT COCKPIT
(Normally powered by right AC bus)



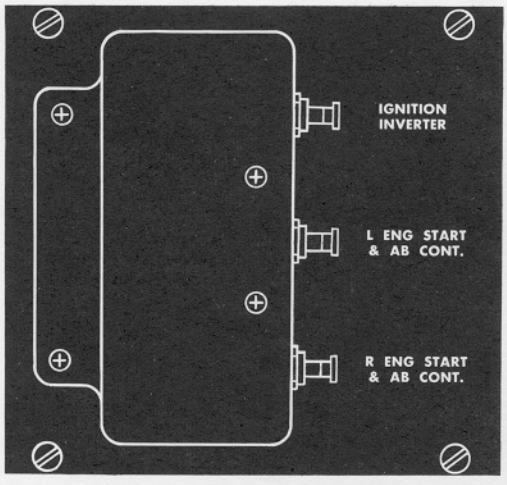
RIGHT CONSOLE — REAR COCKPIT
(Normally powered by right AC bus)







LEFT CONSOLE — FRONT COCKPIT



LEFT CONSOLE — REAR COCKPIT
(Normally powered by left AC bus)

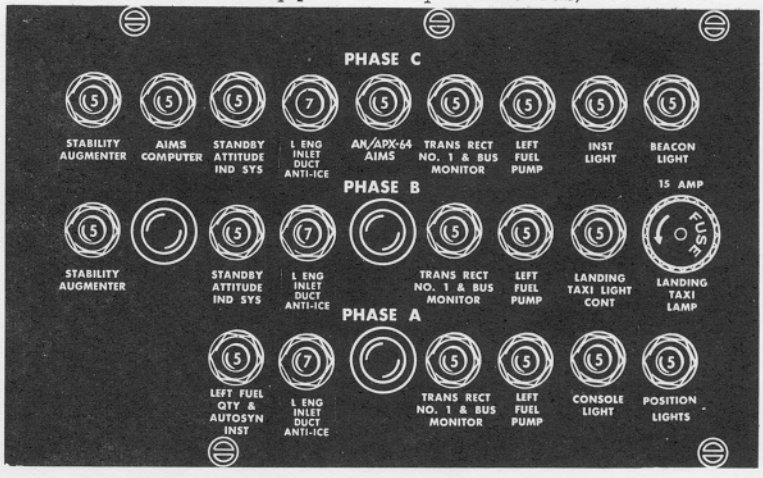


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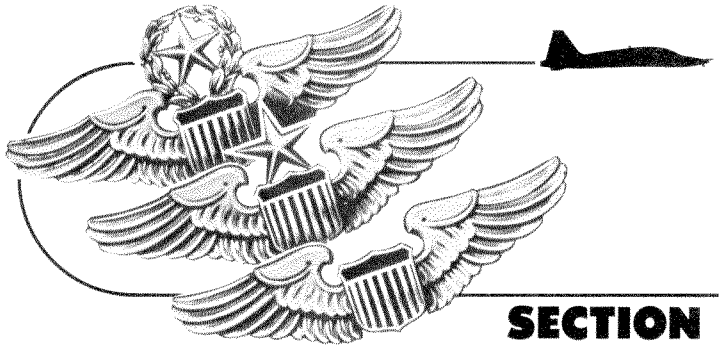
Figure 1–6.



SECTION II NORMAL PROCEDURES

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PREFLIGHT CHECK.

BEFORE EXTERIOR INSPECTION.

1. Form 781–Check for both aircraft status and proper servicing.
2. Ejection Seat and Canopy Safety Pins–Installed.
3. Publications–Check to ensure that all required navigational publications are on board.

EXTERIOR INSPECTION.

Conduct the exterior inspection as shown in figure 2-1.

INTERIOR INSPECTION.

Rear Cockpit (Solo Flights).

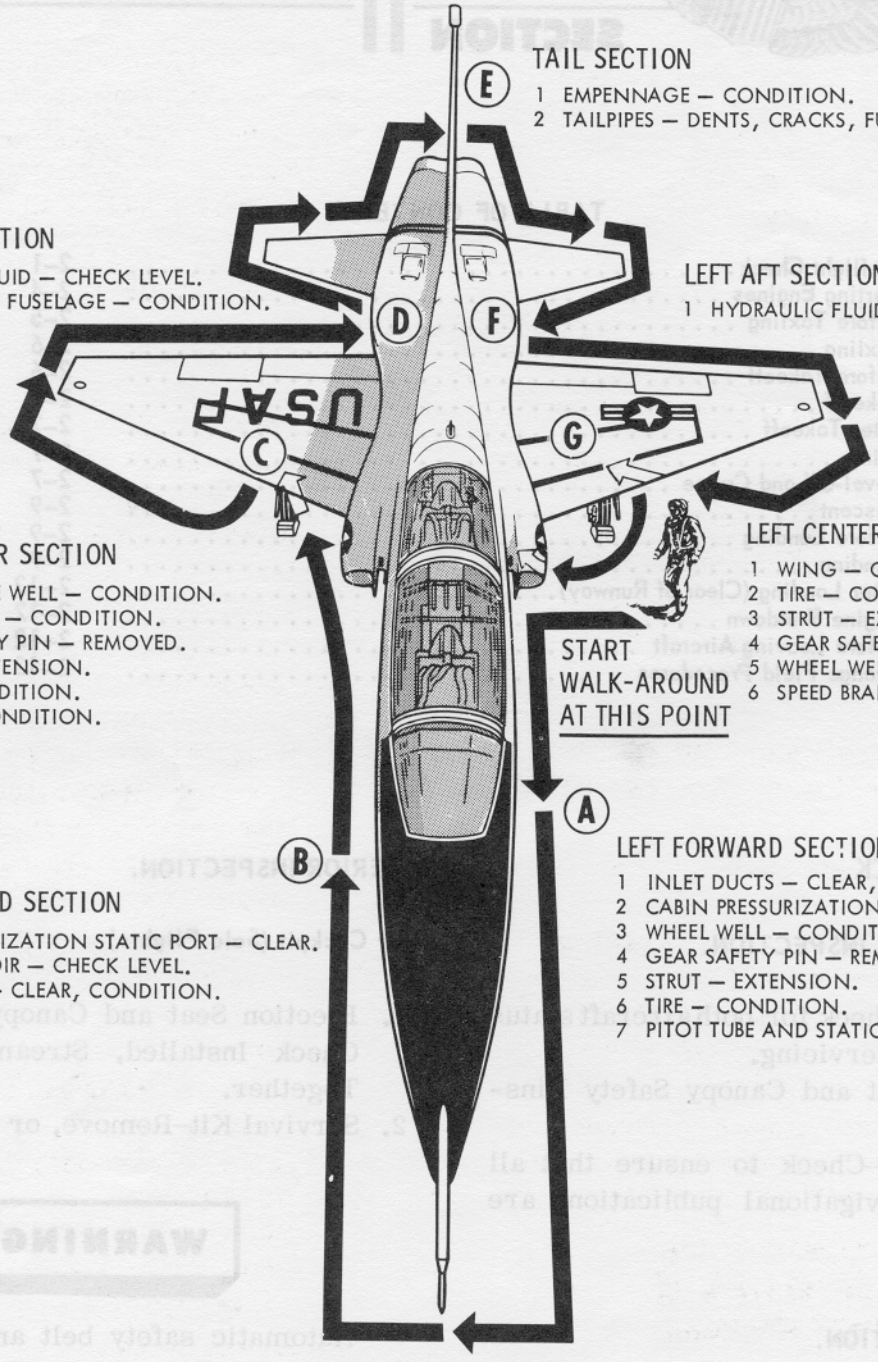
1. Ejection Seat and Canopy Safety Pins–Check Installed, Streamers Fastened Together.
2. Survival Kit–Remove, or Secure.

WARNING

Automatic safety belt and shoulder harness do not provide adequate restraint for survival kit during zero or negative-G maneuvers.

EXTERIOR INSPECTION

DURING THE EXTERIOR INSPECTION, THE AIRCRAFT SHOULD BE CHECKED FOR GENERAL CONDITION, WHEELS CHOCKED, ACCESS DOORS AND FILLER CAPS SECURED, AND FOR HYDRAULIC, OIL, AND FUEL LEAKS, AS WELL AS FOR THE FOLLOWING SPECIFIC ITEMS:



TAIL SECTION

1 EMPENNAGE — CONDITION.
2 TAILPIPES — DENTS, CRACKS, FUEL.

RIGHT AFT SECTION

1 HYDRAULIC FLUID — CHECK LEVEL.
2 UNDERSIDE OF FUSELAGE — CONDITION.

LEFT AFT SECTION

1 HYDRAULIC FLUID — CHECK LEVEL.

RIGHT CENTER SECTION

1 SPEED BRAKE WELL — CONDITION.
2 WHEEL WELL — CONDITION.
3 GEAR SAFETY PIN — REMOVED.
4 STRUT — EXTENSION.
5 TIRE — CONDITION.
6 WING — CONDITION.

LEFT CENTER SECTION

1 WING — CONDITION.
2 TIRE — CONDITION.
3 STRUT — EXTENSION.
4 GEAR SAFETY PIN — REMOVED.
5 WHEEL WELL — CONDITION.
6 SPEED BRAKE WELL — CONDITION.

START WALK-AROUND AT THIS POINT

LEFT FORWARD SECTION

1 INLET DUCTS — CLEAR, CONDITION.
2 CABIN PRESSURIZATION STATIC PORT — CLEAR.
3 WHEEL WELL — CONDITION.
4 GEAR SAFETY PIN — REMOVED.
5 STRUT — EXTENSION.
6 TIRE — CONDITION.
7 PITOT TUBE AND STATIC PORTS — CLEAR.

RIGHT FORWARD SECTION

1 CABIN PRESSURIZATION STATIC PORT — CLEAR.
2 BRAKE RESERVOIR — CHECK LEVEL.
3 INLET DUCTS — CLEAR, CONDITION.

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Figure 2–1.

3. Safety Belt, Shoulder Harness, and Oxygen Hose–Secure and Lock.
4. Stowage Box Cover–Closed and Secured.
5. Communication and Navigation Equipment–Check.
   a. Command radio: Function Switch–BOTH; Manual Preset Guard Button–GUARD.
   b. TACAN: Function Switch–T/R; Channel Selector Knobs–Desired Channel.
   c. ILS: Steering Mode Switch–NORMAL; Navigation Mode Switch–LOCALIZER; Power Switch–ON; Channel Selector–Desired Channel.
6. Command and Navigation Override Switch–OFF.
7. Loose Equipment–Check Securely Stowed.
8. Circuit Breakers–Check.
9. Lights–Off.
10. Oxygen–NORMAL–NORMAL–OFF.
11. Canopy–Closed and Locked.

Front Cockpit (All Flights).

On dual flights, all items marked with an asterisk (*) should also be checked in the rear cockpit.

1. Crew Retractable Steps - Assure Stowed (if required).
   If steps are used, the pilot will assure that they are stowed to prevent flight with the steps extended.

*2. Survival Kit - Attached (if applicable).

*3. Safety Belt, Shoulder Harness, Seat Belt Lanyard, Zero Lanyard, Oxygen Connectors, Hose Retention Strap, and Helmet Chin Strap–Fasten and Adjust.

WARNING

Assure that hose retention strap is adjusted properly to preclude hose separation from quick-disconnect on parachute harness.

*4. Ejection Seat Handgrips–Push (to ensure full down).

*5. Oxygen System–Check (PRICE).

6. Battery Switch–ON.

7. Left Console–Check.
   a. Circuit Breakers–Check.
   b. Gear Door Switch–NORMAL.
   c. Flight Director Switch–ON.
   d. Rudder Trim Knob–CENTERED.
   *e. Wing Flap Lever–OFF.
   *f. Throttles–OFF.
   *g. Speed Brake Switch–OPEN.

8. Instrument and Subpanels–Check.
   a. Compass Switch–MAG.
   b. Fuel Shutoff Switches–NORMAL (guarded position).
   c. Landing Gear Alternate Release Handle–IN.
   d. Landing Light Switch–OFF.
   *e. Landing Gear Lever–LG DOWN.
   *f. Clock–Set.
   *g. Airspeed Indicator–Check.
   *h. Accelerometer–Check.
   i. Cabin Altimeter–Check.
   *j. Steering Mode Switch–As Required.
   *k. Navigation Mode Switch–As Required.
   *l. Marker Beacon Light–Test.
   *m. Intercom Switches–As Required.
   *n. Radio Transfer Switches–As Required.
   o. Comm Antenna–AUTO.
   *p. Circuit Breakers–Check.
   q. Magnetic Compass–Check.
   *r. Altimeter–Set.
   *s. Vertical Velocity Indicator–Check.
   t. Cabin Air Switch–CABIN PRESS.
   u. Cabin Air Temperature Switch–AUTO.
   v. Pitot Heat Switch–OFF.
   w. Engine Anti-Ice Switch–MAN. OFF.
   x. Inlet Duct Anti-Ice Switches–As Desired.

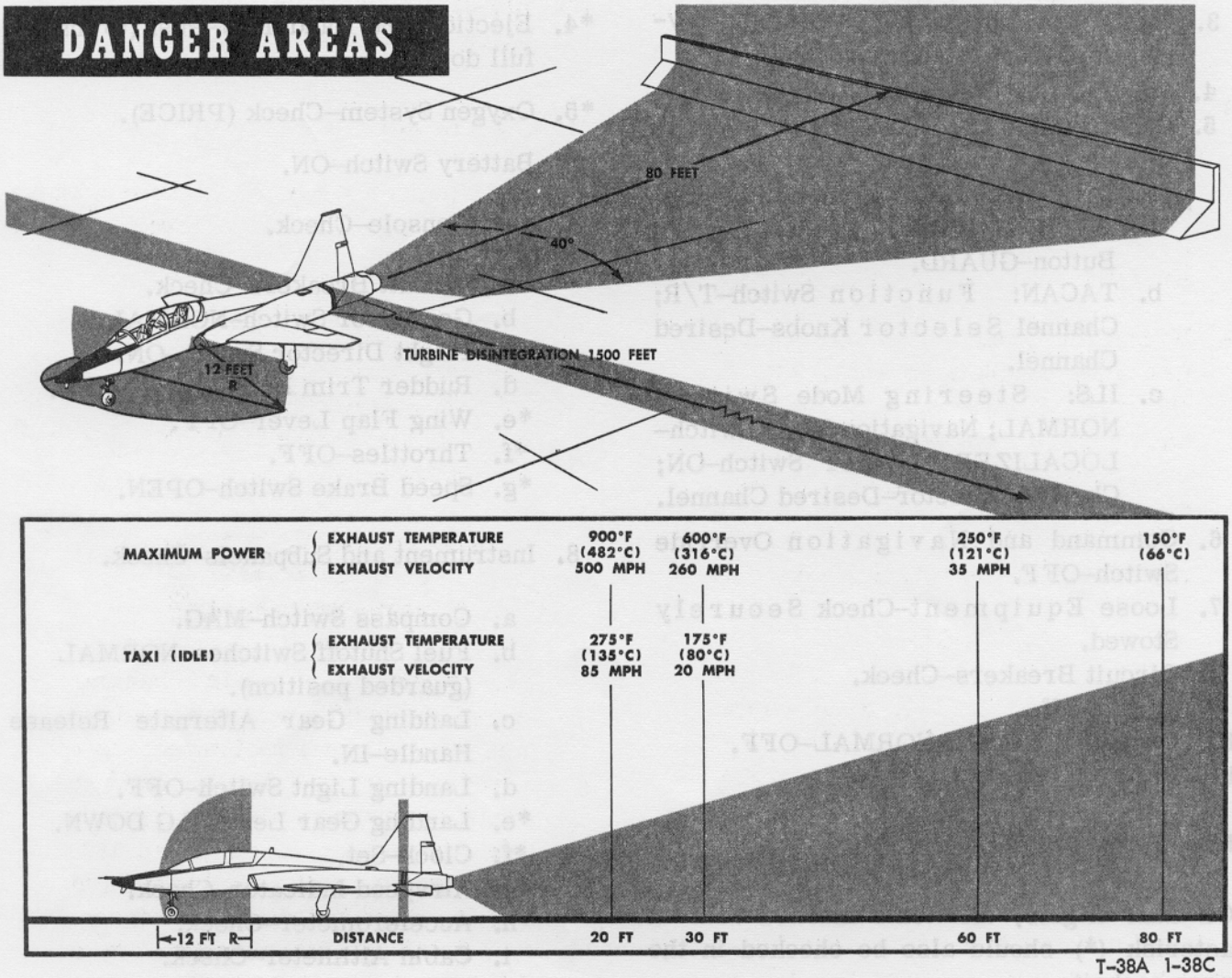


Figure 2–2.

y. Fuel Boost Pump Switches–ON.
z. Crossfeed Switch–OFF.
aa. Fuel and Oxygen Quantity–Check.
ab. Generator Switches–ON.

*9. Warning Test Switch–TEST.

*10. Interior and Position Lights–As Required.

11. Rotating Beacon–ON.

STARTING ENGINES.

RIGHT ENGINE.

Start the right engine first, using the following procedure:

1. Signal for air supply.
2. Engine Start Button–Push Momentarily.
3. Throttle–Advance to IDLE at 14% minimum RPM.

CAUTION

- Prior to moving either throttle to IDLE, assure that respective EGT OFF flag (front cockpit only) is out of view. An engine start cannot be properly monitored with OFF flag in view.

- If ignition does not occur before fuel flow reaches 350 phr, retard throttle to OFF. When all fuel and vapors have been purged from the engine, signal ground crew to turn off air flow. Wait at least 2 minutes to permit fuel to drain before attempting another start.

NOTE

Engine speed of 14% RPM within 15 seconds is desired; however, a start may be attempted with a minimum of 12% within 15 seconds.

4. Engine Instruments–Check.
   a. Exhaust Gas Temperature–Check Within Limits.
   b. Engine RPM–Check at IDLE.
   c. Oil Pressure–Check.
5. Caution Light Panel–Check.

LEFT ENGINE.

1. (Deleted)
2. Left Engine–Start Same As Right Engine.

CAUTION

Do not push left engine start button until a minimum of 30 seconds has elapsed after right engine start button has been pushed. The left engine start cycle will be shortened and may result in a hot start due to loss of external air to the engine.

3. Signal ground crew to disconnect external power and/or air supply.

BEFORE TAXIING.

On dual flights, all items marked with an asterisk (*) should also be checked in the rear cockpit.

*1. UHF, TACAN, ILS–ON.
2. IFF/SIF–STDBY.
3. Canopy Defog, Cabin Temp and Pitot Heat–Check (check Pitot Heat if required).

WARNING

For night or anticipated weather operation with conditions of high humidity and narrow temperature-dewpoint spread, the canopies should be closed and the cockpit temperature increased to the 100° AUTO position to preheat all flight instruments and canopy surfaces. Return temperature control to a comfortable in-flight setting after completion of the lineup check.

*4. Circuit Breaker Panels–Check.
5. Stability Augmenter Yaw Switch–YAW.
6. Flight Trim Switch–Check.
   Actuate trim switch forward and allow stick to travel slightly, then freeze stick and allow pressure to build up. Hold trim switch with stick frozen until pressure ceases to increase. Actuate trim switch aft and make the same check.
7. Takeoff Trim Button–Press.
   Check that indicator light illuminates.
8. Flight Controls–Check.
   With normal movement, hydraulic pressure should not drop below 1500 psi.
9. Speed Brake–Closed.

10. Wing Flaps–Down, then retract to 60%. Check visually for trailing-edge movement of horizontal tail as flaps are actuated. Trailing edge moves down as flaps are lowered, up as flaps are retracted. Verify horizontal tail position with ground crew.
*11. Communication and Navigation Equipment–Check.
Check for proper operation of the ADI, HSI, Standby Attitude Indicator, TACAN, ILS, and Flight Director System. Refer to section IV for description of proper system operation.
11A. Fast Erection Switch–Press and Hold until ADI Sphere Stabilizes (if required).
12. Fuel/Oxy Check Switch–FUEL & OXY GAGE TEST.
*13. Seat and Canopy Safety Pins–Remove.
*14. Brakes–Check Pedal Pressure.
15. Chocks–Removed.

TAXIING.

WARNING

If carbon monoxide contamination is suspected during ground operation, use 100% oxygen.

CAUTION

- If brake drag is encountered or suspected the aircraft should be aborted.
- Simultaneous use of wheel brakes and nosewheel steering to effect turns results in excessive nosewheel tire wear. Nosewheel tires are severely damaged when maximum deflection turns are attempted at speeds in excess of 10 knots.

1. Turn and Slip Needle–Check.
2. HSI–Check Correct Movement in Turns.

BEFORE TAKEOFF.

1. Battery Switch–Check ON.
2. (Deleted)
3. Fuel Boost Pumps–Check ON.
4. Canopy Defog, Cabin Temp, and Pitot Heat–As Required.
5. Engine/Duct Anti-Ice–As Required. Refer to section IV for system operation limitations.
6. (Deleted.)

CAUTION

Prolonged inlet duct anti-ice operation at IDLE under nonicing conditions can cause the duct overheat – caution light to illuminate.

7. (Deleted.)
8. Seat Belt Lanyard and Zero Lanyard–Check Attached.
9. Cockpit Loose Items–Check Secured.

CAUTION

Both cockpits should be checked for loose items (cockpit utility light, instrument hood bungee cords, etc). Check secured before closing canopy.

10. Canopy–Closed, Locked; Warning Light–Out.

CAUTION

Should the canopy jam in the full "up" position, the aircraft should not be taxiied or towed until cleared by qualified maintenance personnel. Efforts to close the canopy or vibrations set up by aircraft movement could result in canopy separation.

11. Takeoff Data–Review.

LINE-UP CHECK.

1. Nosewheel Steering–Check Disengaged.
2. IFF/SIF–As Required.
3. Throttles–MIL.
4. Master Caution Light–Out.
5. Engine Instruments–Check.
6. Hydraulic Pressure–Check.

TAKEOFF.

The following takeoff procedure, and that given in figure 2-3, will produce the results stated in the takeoff distance charts of Part 2 of Appendix I:

1. Wheel Brakes–Release.
2. Throttles–MAX.

CAUTION

The takeoff should be aborted if either afterburner fails to light within 5 seconds, or if the light-off is abnormal.

3. Engine Instruments–Check for Proper Indication.

CROSSWIND TAKEOFF.

Follow normal takeoff procedure.

AFTER TAKEOFF.

1. Landing Gear Lever–LG UP, when definitely airborne.
2. Wing Flap Lever–UP.

CLIMB.

1. Zero Lanyard–Disconnect When Passing Thru 10,000 Feet.

NOTE

Leave zero delay lanyard connected at all times below 10,000 feet pressure altitude, including flights in which 10,000 feet may be exceeded temporarily. Disconnect the lanyard when passing thru 10,000 feet pressure altitude, when this altitude will be exceeded for prolonged periods. If operating above terrain over 8000 feet high, the zero delay lanyard should remain connected until the aircraft is at least 2000 feet above the terrain.

2. Oxygen System–Check.
3. Cabin Pressurization–Check.
4. Canopy Defog and Cabin Temp–As Required.
5. Engine Anti-Ice Switch – MAN. OFF at 25,000 feet and above, except in visible moisture.
6. Altimeter–Reset As Required.

LEVEL-OFF AND CRUISE.

1. Oxygen System–Check.
2. Cabin Pressurization–Check.
3. Fuel Quantity–Check.

FUEL MANAGEMENT.

Avoid crossfeed operation above 30,000 feet unless necessary. Below 30,000 feet, crossfeeding is recommended when fuel difference exceeds 200 pounds. Attempt to enter traffic pattern in a fuel-balanced condition. Differential power settings should be used to balance fuel to avoid use of crossfeed operation during low fuel conditions.

NOTE

If a fuel unbalance is experienced for no apparent reason, perform gage test prior to crossfeeding.

1. Fuel Quantity–Check.
2. Crossfeed Switch–ON.

NORMAL TAKEOFF (TYPICAL)

BASED ON GROSS WEIGHT OF 11,800 LB

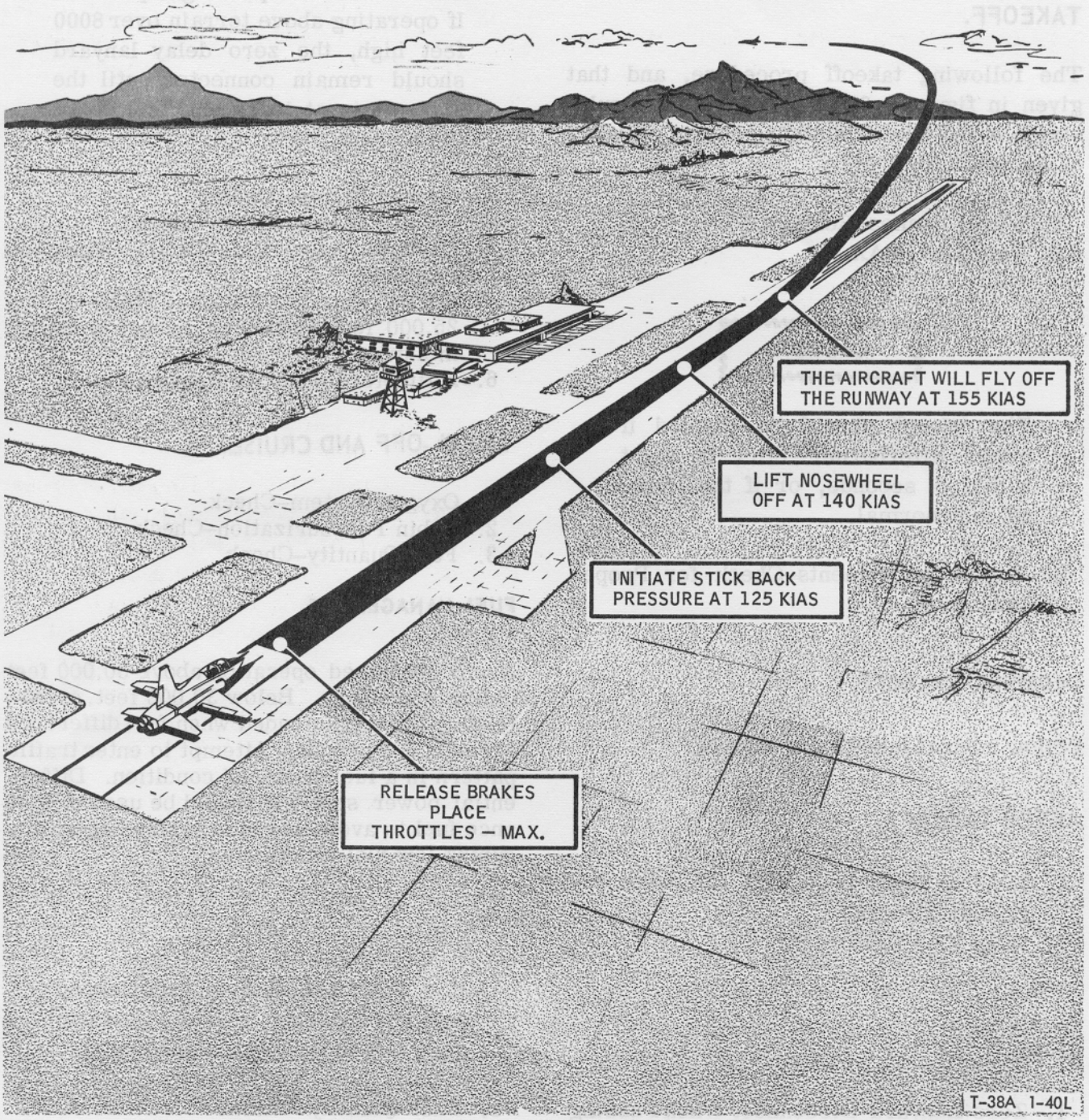


Figure 2–3.

3. Boost Pump Switch (on side of lower fuel quantity)–OFF.

WARNING

If crossfeed operation is continued until the active system runs dry, dual engine flameout will occur.

4. Boost Pump Switches–Both ON When Fuel Quantities Are Equal.
5. Crossfeed Switch–OFF.

DESCENT.

1. Canopy Defog, Cabin Temp, and Pitot Heat–As Required.
2. Engine/Duct Anti-Ice–As Required.

CAUTION

Engine/duct anti-ice system operation prohibited during descent and landing, except in suspected (OAT 15°C and below and visible moisture) or known icing conditions.

3. (Deleted.)
4. Altimeter–Reset As Required.
5. Zero Lanyard–Attach before high fix for penetration or 10,000 feet normal descent.

NOTE

If operating above terrain over 8000 feet high, the zero lanyard should be connected at least 2000 feet above the terrain.

6. Fuel Balance–Check.

BEFORE LANDING.

The following procedures should be accomplished before landing. See figure 2-4 for pattern speeds:

1. Crossfeed Switch–OFF.
2. Zero Lanyard–Check Attached.

2A. Compute Pattern Airspeeds.

3. Gear–Down and Check Down.
4. Wing Flaps–Down.

LANDING.

Refer to figure 2-4 for recommended landing and go-around pattern. After touchdown, continue to increase back-pressure on the stick to obtain the highest possible nose-high attitude without flying the aircraft off the runway. Just prior to reaching 100 KIAS, lower the nosewheel to the runway and begin wheel braking.

NORMAL LANDING.

After the nosewheel is lowered to the runway, a single smooth brake application should be used to stop, taking full advantage of the available runway. Refer to section V for landing rate of descent and to the appendix for landing distance.

MINIMUM ROLL LANDING (DRY RUNWAY).

To make a minimum roll landing, decrease airspeed 10 knots on final approach to assure touchdown at speeds noted in the appendix landing distance charts. Immediately after touchdown and while the nosewheel is still off the runway, commence optimum braking. Smoothly lower the nosewheel to the runway while continuously applying optimum braking.

LANDING (WET OR SLIPPERY RUNWAY).

Decrease airspeed 10 knots on final approach to assure touchdown at speeds noted in the appendix landing distance charts. After touchdown, continue to increase back pressure on the stick to obtain the highest possible nose attitude without flying the aircraft off the runway. Maintain the nose high attitude to 100 KIAS, then lower the nosewheel to the runway and apply optimum braking. On a wet or slippery runway, extreme caution should be used when applying brakes to avoid skidding, slipping, or blowing a tire due to hydroplaning action.

LANDING AND GO-AROUND PATTERN

(TYPICAL)

NORMAL LANDING GROSS WEIGHT OF 9200 LB

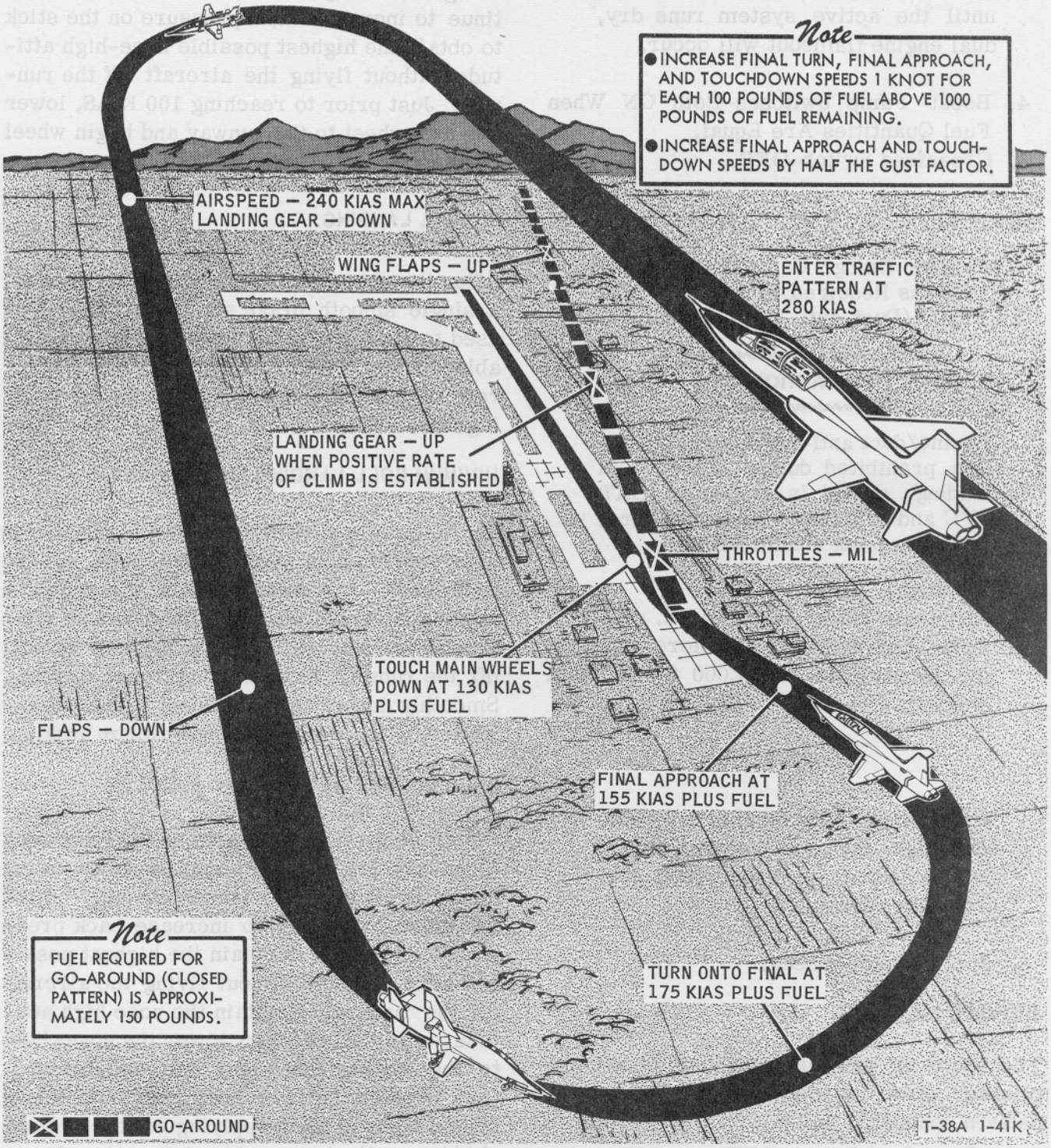


Figure 2–4.

CROSSWIND LANDING.

Approach and Touchdown.

On final approach, counteract drift by crabbing into the wind maintaining flight path alignment with the runway. The crab should be held until touchdown. Do not exceed 500 FPM sink rate at contact. In crosswinds above 15 knots, touchdown should be planned for the center of the upwind side of the runway. Maintain precise airspeed control throughout the final approach; in gusty conditions, increase the indicated airspeed by one half of the gust increment above the wind velocity.

After Touchdown.

The normal landing attitude should be maintained while the stick is gradually moved aft until full back stick is obtained. Maintain directional control of the aircraft with the rudder. A too-rapid increase in the landing attitude angle may cause the aircraft to become airborne and drift across the runway. Drift will create a high probability of tire damage. When the airspeed decreases to 100 KIAS, lower the nosewheel to the runway. Lowering the nose immediately after touchdown in a crosswind will produce a compression of the downwind strut, causing the aircraft to weathervane into the wind. This motion usually results in damage to the downwind tire.

USE OF WHEEL BRAKES.

Wheel Brake Operation.

To minimize brake wear, the brakes should be used as little and as lightly as possible. Care should be exercised to take full advantage of the length of runway during landing or aborted takeoff, to minimize use of brakes during turns, and to avoid dragging the brakes during taxiing. When there is considerable lift on the wings, such as immediately after touchdown, heavy brake pressure will lock the wheel more easily than when the same pressure is applied after the full weight of the aircraft is on the tires. A wheel once locked will remain locked if the same or greater brake pressure is maintained, even though weight on the wheels increases as lift decreases. Optimum braking occurs when the wheel is in an incipient skid - i.e., the wheel is still rotating but only a slight increase in brake pressure would cause a complete skid. A complete skid decreases braking action because of a decrease in the coefficient of friction between the sliding tire and the runway surface; the scuffing action causes small bits of rubber to act as rollers under the tire, and as skidding continues, the heat generated starts to melt the rubber and the molten rubber acts as lubricant. Further application of brake pressure during a skid could increase the tendency for the aircraft to turn away from the wheel developing the greater skid, the end result possibly being a blown tire with no braking action on that wheel but a tendency for the aircraft to turn in the direction of the blown tire.

Optimum Braking Action.

Apply brakes in a single, smooth application with constantly increasing pedal pressure. If skidding occurs, momentarily release brake pressure and immediately reapply brakes. This procedure will provide the shortest stopping distance possible from wheel braking action. If runway length is insufficient to completely stop the aircraft, prepare for barrier engagement.

Brake Operation at High Speed.

Extreme care should be used in applying brakes at high speed to prevent skidding of the tires. As discussed above, very little pressure is required to develop a skid while considerable lift is on the wings. If skidding is believed to be occurring, momentarily release pressure and again gradually apply increasing brake pressure.

GO-AROUND.

Make the decision to go-around as early as possible. Military power is normally sufficient for go-around but do not hesitate to use maximum power if necessary. If conditions do not permit an aerial go-around, do not try to hold the aircraft off the runway; continue to fly the aircraft to touchdown and follow this procedure:

1. Throttles–MIL (MAX if necessary).
2. Landing Gear Lever–LG UP, when definitely airborne.
3. Wing Flap Lever–UP.

NOTE

If a touchdown is made, lower the nose slightly and accelerate to takeoff airspeed, then establish takeoff attitude and allow the aircraft to fly off the runway.

TOUCH-AND-GO LANDINGS.

To make a touch-and-go landing, perform the desired approach and landing. After touchdown, follow the normal go-around procedure.

WARNING

Touch-and-go landings encompass all aspects of the landing and takeoff procedures in a relatively short time span. Be constantly alert for possible aircraft malfunctions and/or unsafe operator techniques during these two critical phases of flight.

CAUTION

Do not make practice landing after an alternate gear extension until the system has been recycled to provide pressure on the "down" side of the system.

AFTER LANDING (CLEAR OF RUNWAY).

1. Cabin Altimeter–Check.
   If reading is below field elevation, place cabin air switch at RAM DUMP before opening either canopy.
2. Cockpit Loose Items–Check Secured (before opening canopy).
3. Gear Door Switch–OPEN.
4. Takeoff Trim Button–Press.
5. Wing Flaps–Up.
6. Speed Brake–Open.
7. Pitot Heat–OFF.
8. Engine Anti-Ice Switch–MAN. OFF.
9. (Deleted.)
10. TACAN, ILS, IFF/SIF–OFF.

CAUTION

Ensure that instrument hood bungee cords are hooked before opening rear canopy.

ENGINE SHUTDOWN.

1. Position Lights–OFF.

NOTE

Allow 10 seconds for landing light retraction prior to engine shutdown.

1A. Operate engines at IDLE for minimum of 1 minute.
1B. Canopy--Unlocked.

NOTE

The canopy seals will remain inflated if engines are shut down with both canopies locked.

2. Throttles–OFF.
3. Seat and Canopy Safety Pins–Install.
4. All Unguarded Switches–OFF.
5. Oxygen–100%.

BEFORE LEAVING AIRCRAFT.

1. Wheels–Chocked.

STRANGE FIELD PROCEDURES.

The following checklist provides guidance for operation at fields that do not normally support the T-38A:

The following checklist provides guidance for operation at fields that do not normally support the T-38A:

1. Oil: Use MIL-L-7808 (F) or (G), (NATOO–148). Alternate: None.
   Check oil level immediately after flight.
2. Fueling: Use MIL-T-5624, Grade JP-4, (NATO F-40). Alternate: None.
   Single-Point–Use a 45-55 psi system. Start fuel flowing and then move the precheck valve handle located adjacent to the single-point fueling adapter, to the PRIM (primary) position. All fuel flow should stop within 10 seconds. Stoppage is indicated by fuel flow not greater than 10 gallons per minute at fuel truck meter. Return precheck valve to OFF. Allow fuel flow to continue for a short duration and then place precheck valve handle in the SEC (secondary) position. All fuel flow should stop within 10 seconds. Return precheck valve to OFF position and continue refueling. If fuel flow fails to stop in both check positions, do not use single point refueling.

   Manual–Service left system first or aircraft may settle on tail.

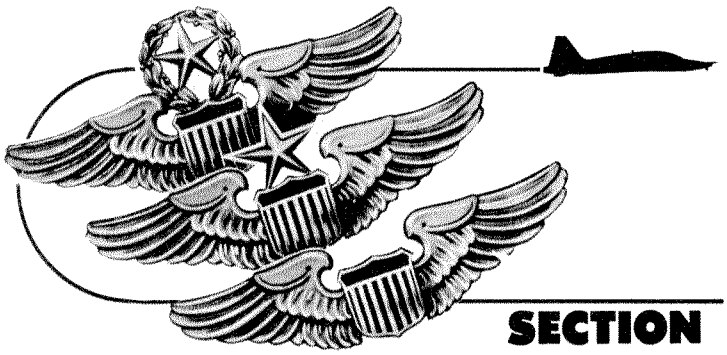
2A. Oxygen: Use MIL-O-27210.

3. Hydraulic Fluid: Use MIL-H-5606 (NATO H-515).
4. Tire Pressure:
   Main–225 psi. Nose–75 psi.
5. Loose Fasteners: Use Torq-set bit.
6. Air Starting Units:

   Air Force - MA-1, MA-1A, MA-1MP, MA-2, MA-2MP, M32A-60, MA-3MP, and 502-70.

   Navy - GTC-85, MA-1E, WELLS AIR START SYSTEM, and RCPP/RCPT/NCPP-105.

SECTION III
(SEE T.O. 1T-38A-1)



AUXILIARY EQUIPMENT

SECTION IV

T-38A 1-103

ENGINE/DUCT ANTI-ICE SYSTEM.

The engine/duct anti-ice system consists of a hot air engine anti-ice system, electrical heating inlet duct anti-ice system, engine anti-ice switch, two anti-ice inlet duct switches, and the necessary caution panel indicator lights.

ENGINE ANTI-ICE SYSTEM.

Engine anti-icing is accomplished by directing engine compressor eighth-stage hot air to the inlet guide vanes and bullet nose of the engine when the normally closed, electrically-controlled anti-ice valve is opened. At engine speeds of 94% to 98% RPM, an increase in EGT of approximately 15°C is normal when the system is operating. The system fails to the on position with a complete loss of ac electrical power. Below 65% RPM, the anti-ice valve is always open, allowing hot air to flow to the inlet guide vanes and bullet nose of the engine, regardless of the position of the engine anti-ice switch. A 9% loss in MIL thrust and a 6.5% loss in MAX thrust can be expected with the engine anti-ice system operating.

Engine Anti-Ice Switch.

The engine anti-ice switch, placarded ENG ANTI-ICE (figure 1-2), on the right subpanel of the front cockpit provides control of the engine/duct anti-ice systems. The switch has two positions, placarded MAN ON (up position) and MAN. OFF (down position). The switch is wired in series with the two inlet duct anti-ice switches. Placing the engine anti-ice switch at MAN. ON illuminates the ENG ANTI-ICE ON caution light and activates the engine anti-ice system and the inlet duct anti-ice system if the inlet duct anti-ice switches are in the ON position. The MAN. OFF position deactivates both anti-ice systems.

Engine Anti-Ice On Caution Light.

The engine anti-ice on caution light, placarded ENG ANTI-ICE ON (figures 1-3 and 1-4), on the right console of each cockpit will illuminate when the engine anti-ice switch is turned on. Illumination of the light alerts the crewmember that the engine anti-ice switch is on. The light will go out when the engine anti-ice switch is turned off.

INLET DUCT ANTI-ICE SYSTEM.

The inlet duct anti-ice system consists of electrical heating elements (blankets) in the lip of each engine air inlet duct and duct overheat caution light. The left duct heating element is powered by the left generator and the right duct heating element by the right generator. An engine or generator failure will cause the loss of the corresponding inlet duct heating element. There is no provision for the operating generator to power the opposite inoperative inlet duct heating element. Temperature sensors are incorporated in the inlet duct blanket to detect an overheat condition.

Inlet Duct Anti-Ice Switches.

Two switches, placarded LEFT and RIGHT INLET DUCT ANTI-ICE (figure 1-2), on the right subpanel in the front cockpit provide individual control of the left and right inlet duct heating elements. Each switch has three

positions: on (up) position placarded LEFT/RIGHT, a center position placarded OFF, and a spring-loaded position placarded TEST. Both switches are wired in series with the engine anti-ice switch, and function only when the engine anti-ice switch is on.

Duct Overheat Caution Light.

The DUCT OVERHEAT caution light on the right console in each cockpit (figures 1-3 and 1-4), when illuminated, indicates that one or both of the inlet duct anti-ice blankets have exceeded the normal operating temperature.

Procedure.

NOTE

An appropriate entry in the Form 781 is required if the DUCT OVERHEAT caution light illuminates.

If the DUCT OVERHEAT caution light illuminates, proceed as follows:

In nonicing, conditions:

1. Engine Anti-Ice Switch - Check MAN. OFF.

In icing conditions:

1. Engine Anti-Ice Switch - MAN. ON until clear of icing conditions, then MAN. OFF.

NOTE

In icing conditions (OAT 15°C and below and visible moisture), illumination of the caution light indicates a possible malfunction of the temperature sensors.

ENGINE/DUCT ANTI-ICE SYSTEM OPERATION.

WARNING

Engine/duct anti-icing should be activated prior to encountering icing conditions (approximately 1 minute). If ice is allowed to build up on duct lip or engine inlet guide vanes, the subsequent shedding and ingestion of ice when the engine/duct anti-ice system is activated may damage the engine.

Ground Operation .

Ground operation of the engine/duct anti-ice system is prohibited except just prior to take-off into suspected (OAT 15°C and below and visible moisture) or known icing conditions.

In-Flight.

The engine/duct anti-ice system should be activated when flying thru suspected (OAT 15°C and below and visible moisture) or known icing conditions. System operation is prohibited under the following conditions:

a. No icing conditions.

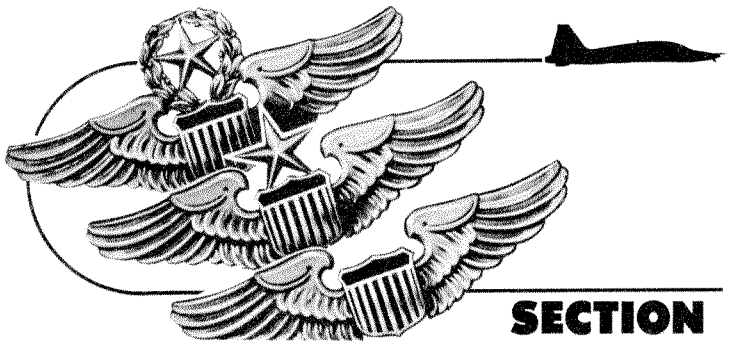
b. Outside air temperature is above 15°C.

c. Above 25,000 feet except in visible moisture.

CAUTION

Use of the engine/duct anti-ice system during prohibited conditions may overheat and damage the inlet duct blankets.

SECTIONS V THRU VIII
(SEE T.O. 1T-38A-1)



ALL-WEATHER OPERATION

SECTION IX

T-38A 1-107

ICE AND RAIN

The possibility of engine and airframe icing is always present when the aircraft is operating under instrument conditions. Icing is most likely to occur when descending for landing thru low clouds when the temperature is at or near freezing. When icing conditions are encountered, immediate action should be taken to avoid further accumulation of ice by changing altitude, course, or increasing the rate of climb and airspeed. The most probable free air temperatures vary from -4°C at sea level to -30°C at 20,000 feet. Above 25,000 feet, due to the inability of the air to contain moisture, the amount of icing is negligible. Icing conditions which may be encountered are trace, light, moderate, and heavy. Moderate and heavy icing, particularly, can cause rapid buildup of ice on the aircraft surfaces and greatly affect performance.

WARNING

Anti-icing equipment for the windshield, wings, and empennage is not provided. Cruising in icing conditions should be avoided.

When icing conditions are unavoidable, the pitot heat switch should be placed at PITOT HEAT, engine and inlet duct anti-ice switches actuated to the on position, and the canopy defog rheostat switch turned to full increase. Ingestion of accumulated ice into the engine may be evidenced by a jar or noise in the engine. This may result in damage to the inlet guide vanes and first-stage compressor blades and may cause engine compressor stall or flameout. Engine instrument indications may remain normal, even though engine damage from ice has been experienced. It is most probable that the engine will not be totally disabled. After ice ingestion, the affected engine should be operated at the lowest possible RPM necessary to make a safe landing, avoiding abrupt or rapid throttle movements.

CAUTION

If flight in icing conditions results in ice accumulation on the aircraft, enter this information in Form 781.

The aircraft is not equipped with rain removal equipment. Instrument approaches in heavy rain are possible, but forward visibility in icing conditions is further reduced and may be completely obscured.

NOTE

To ensure effective anti-icing, maintain a minimum of 80% RPM when the engine anti-icing system is turned on.

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PERFORMANCE DATA APPENDIX I
(SEE T.O. 1T-38A-1)

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