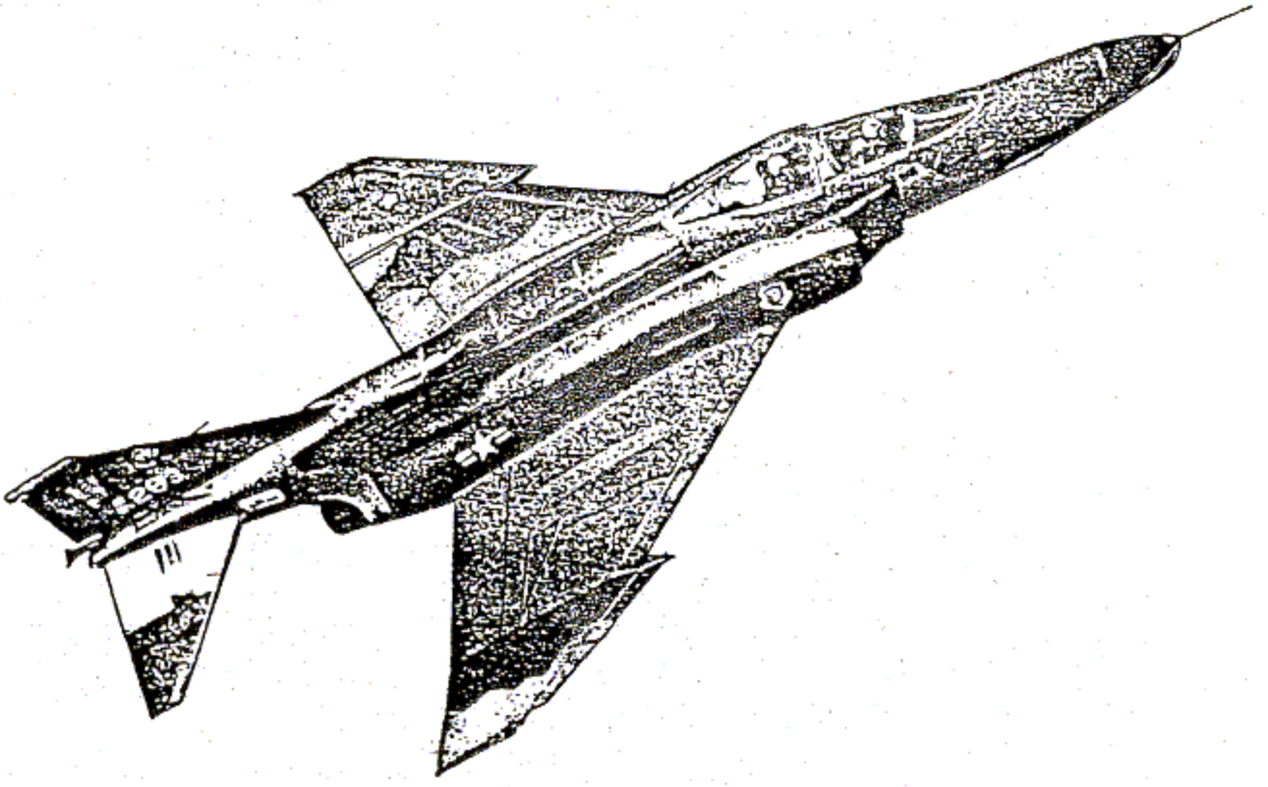
PHANTOM GUIDE

A GUIDE TO THE F-4



JULY 1988

USAF TEST PILOT SCHOOL

EDWARDS AIR FORCE BASE, CALIFORNIA

DEPARTMENT OF THE AIR FORCE
USAF TEST PILOT SCHOOL
EDWARDS AIR FORCE BASE, CALIFORNIA 93523

REPLY TO
ATTN OF:

SUBJECT: TENO 5 May 1988

TO F-4 Transition

TPS F-4 Pilots

1. The Phantom Guide contains information from TAC Manual 55-4, Volumes I and II, along with AFSCR 55-7, Chapter 11. It has been adapted by USAFTPS for your transition training.

2. This guide is intended for use with TPS curriculum missions only and may not comply with the requirements of other users.

3. The Air Force Flight Test Center's F-4 fleet consists of RF-4C, F-4C, F-4D, and F-4E models, and one YF-4E model. All AFFTC F-4E models are "hardwing."

4. All references to knots pertain to what is read on the cockpit gauge (i.e., KIAS for RF-4C and F-4E, KCAS for F-4C/D).

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1. PREFLIGHT AND GROUND OPERATIONS

1.1 Cockpit Checks Prior to Entry

1.1.1 Follow the checklist and preflight your ejection seat. You should be familiar with each item of the checklist. The ejection seat is your last resort in the event of an aircraft emergency. Make sure you are not the weak link in the ejection sequence because of a poor preflight. Should you find anything wrong with your seat, notify egress personnel. Flight line maintenance troops are not qualified to perform maintenance on ejection seats. Again, notify your instructor, and obtain a spare if the delay is excessive.

1.1.2 Ensure that the center mirror on the forward canopy is tilted back sufficiently to allow the canopy to close. If the canopy is dirty, see that the crew chief cleans it.

1.1.3 Make sure the cockpit is clean. Check that the area under the seat is clear of all loose items. Never store anything under the ejection seat.

1.2 Before Starting

1.2.1 Develop a pattern for strapping in that is suitable for you and ensures you will not omit any items. It is embarrassing to black out because you forgot to connect your G-suit, and, needless to say, you could sustain severe injuries if your leg straps or harness were improperly connected.

1.2.2 Make sure your seat belt is tight enough and stow all loose items so you and your equipment won't float during negative g maneuvers.

1.2.3 The crew chief will pull the ejection seat pins after you are strapped in. Do not permit the crew chief to stow your pin bag for you.

1.2.4 Complete your interior checks by the checklist.

1.2.5 Approximately two minutes before engine start time (or flight check in), ask the crew chief to turn on the CNI (located in the left wheel well). Remember that ground operation of the CNI is limited to ten minutes of accumulated time in a one hour period.

1.3 Engine Start Procedures (Also see Appendix B)

1.3.1 Engine starting is covered in the Dash-1. Should any problems occur, handle them according to the checklist and Dash-1. If fire fighting equipment is required, notify ground control giving them your location and tail number. Then egress the aircraft according to Emergency Evacuation Procedures.

1.3.2 After starting No 2, remember that in checking the left spoiler you are looking to see that a small stick deflection does not cause full deflection of the spoiler and that the spoiler returns to the flush position when stick is neutral.

1.4 Before Taxiing

1.4.1 An operational IFF/SIF is required for all single ship missions. If the self-test feature does not indicate a good system, recheck the bulb and wait approximately two to three minutes more for system warm-up. If the set does not self-test, attempt a check with a ground check facility (if available), or contact maintenance personnel. Only Mode 2 and Mode 3A self-test functions are operational.

1.4.2 Pay particular attention to the flight control checks. In addition to crew chief communications, the FTE/IP should visually confirm flight control movement in the proper directions. (The mirrors may be used for this purpose.)

1.4.3 The FTE/IP should visually confirm the position of the ailerons in relation to the fuel dump masts. Some fuel dump masts have been stressed over a period of time, so they are not flush with the ailerons when the ailerons are neutral. This reference should be used on all Rig Checks and Before Landing Checks.

1.4.4 If the mission does not require an autopilot, the aircraft may be flown with minor autopilot problems. Do not engage the autopilot at any time in flight if this is the case.

1.4.5 Alert the FTE/IP prior to engaging the SPC so that each crewmember can check his altimeter according to the Dash-1. Do not confuse engine master switch with SPC.

1.5 Taxiing

1.5.1 Slowly advance throttles to pull out of the chocks. Use the minimum power necessary - A maximum of 75% is a good rule of thumb. Be sure that RPM is at idle before initiating any turns. Use caution.

NOTE: DO NOT JET BLAST PERSONNEL OR EQUIPMENT.

1.5.2 The AC will be responsible for initiating all further checklist items as required. (This includes checklists from TAXIING through ENGINE SHUTDOWN.) The checklist items will be accomplished on a challenge and response basis. The FTE/IP reads the item to be checked, and the AC responds with the action accomplished.

1.5.3 Check the brakes while taxiing straight ahead. It is not necessary to "stomp on the binders" and completely stop the aircraft.

1.5.4 Engage nose gear steering by pushing the nose gear steering button on the stick with the rudder pedals neutral, prior to moving forward. After moving forward, only slight rudder deflection in each direction is required to check nose gear steering. Check brakes and steering at initial movement. If they don't work, you don't want to find it out at 10 knots while heading toward the next line of aircraft.

1.5.5 Operation of the flight instruments should be checked after leaving the parking area.

1.5.6 Taxi at a moderate speed consistent with taxiway conditions and congestion. Slow the aircraft prior to turns to avoid excessive side loads on the gear. Do not ride the brakes to control speed, as this will result in hot brakes.

1.5.7 Taxi spacing will be a minimum of 150 ft staggered or 300 ft nonstaggered.

1.6 Quick Check/Maintenance Inspection

Prior to takeoff, all aircraft will receive a "quick check" by maintenance personnel.

1.6.1 Taxi into the Quick Check Area following the maintenance team chief's instructions. When stopped, team chief may establish intercom communication. Ensure rear crewmember has selected HOT MIC.

1.6.2 Keep your hands in view and clear of all switches and flight controls while maintenance personnel are inspecting the aircraft, unless they request otherwise.

1.6.3 Count the number of personnel who go under your aircraft to ensure they are all clear before you begin any further checks.

1.6.4 Follow ground crew instructions. The team chief will signal to move the aircraft forward slightly after the initial tire check has been accomplished.

1.6.5 Canopies should be closed at idle RPM and in sequence, rear canopy first. The defog/footheat lever should be in the footheat and the temperature knob should be no higher than the 2 o'clock position. Check 9 seconds max for closure, that the canopy unlock light goes out, and that the canopy locks by visually checking the alignment of the tapes on the canopy lock push rod and the bracket hanging under the left canopy sill. Confirm these checks with the other crewmember by a statement such as, "Canopy down and locked, lights out, stripes aligned."

1.7 Taking the Active

1.7.1 Complete the rest of the "before takeoff" checklist. The FTE/IP will verify flap indicators at DOWN. Have your feet off the brakes and the aircraft stopped before turning the anti-skid on to avoid brake hangups.

1.7.2 Visually check other aircraft in the flight for proper configuration. Confirm that the other crewmember is ready for takeoff.

2. TAKEOFF AND DEPARTURE

2.1 Normal Takeoff

All maximum afterburner takeoffs will be made using the following procedures:

2.1.1 Run both engines up to 85% RPM and recheck engine instruments, hydraulic pressures, and pneumatic pressure.

2.1.2 Engage nose gear steering, release brakes, and move throttles full forward. As engines reach full MIL range, check instruments, apply outward pressure and move the throttles forward to full afterburner. Check the nozzle indicators.

2.1.3 Use nose gear steering to move to the center of the runway.

2.1.4 Disengage nose gear steering when rudder becomes effective for steering (approximately 70 knots).

2.1.5 As the aircraft accelerates, the stick should be moved sufficiently aft to obtain 10 degrees to 12 degrees nose high pitch attitude at nosewheel lift-off airspeed. You may want to use the heavyweight takeoff technique and bring the stick full aft prior to 80 knots.

2.1.6 The nose will begin to lighten and bounce slightly above 110 knots.

2.1.7 As nosewheel lift-off airspeed is approached, the nose will smoothly rise. When nosewheel lift-off occurs, vary back stick to maintain 10 degrees to 12 degrees pitch attitude as the aircraft becomes airborne.

2.2 After Takeoff

2.2.1 Confirm that you are safely airborne.

2.2.2 Retract the landing gear. Apply forward pressure to the gear handle while moving it up to avoid actuating emergency gear lowering. The AUX AIR DOORS, WHEELS, and MASTER CAUTION lights may illuminate momentarily as the landing gear and flaps are retracted.

2.2.3 Raise the flaps (above 180 KIAS). The flap switch is in an awkward location and may be difficult to find initially. Practice finding this switch prior to your first takeoff.

2.2.4 The FTE/IP will monitor gear and flap retractions. Advisory calls such as "gear moving; flaps moving. Gear up; flaps up" should be made. Approaching 300 knots, give another advisory airspeed call to remind the Aircraft Commander to terminate afterburner.

2.2.5 Terminate afterburner at 300 knots (for normal takeoffs). Check fuel flow, RPM, EGT, and nozzle position to insure that engines are operating properly.

3. TAKEOFF EMERGENCIES

When a serious emergency occurs during takeoff, you do not have time to pause and consider possible courses of action. Therefore, possible emergencies should be thoroughly discussed in briefings and aircrew actions thoroughly planned and coordinated. Consider the following:

3.1 Abort. There is no barrier available. Consider what your GO/NO GO criteria will be for blown tire, engine failure, etc.

3.2 Jettison of external stores on runway or just after becoming airborne (landing gear handle must be up).

3.3 Landing ASAP. Gross weight limitations. Type of pattern to be flown. Lakebeds.

3.4 Single engine continued takeoff - leave flaps down till 230 knots.

3.5 Ejection. Controlled vs uncontrolled. Use of command selector valve. Crew coordination.

3.6 BLC Malfunction - Flaps down. Watch blow up speed.

3.7 Maintain aircraft control (and, if possible, fly to a safe area at a safe altitude), analyze the situation, take the proper action, and land as soon as practicable.

3.8 Birdstrikes. Crew coordination item.

4. ENROUTE - GENERAL

4.1 Ops/Cruise Checks

Ops/cruise checks will be accomplished frequently, but at least at level off, every 30 minutes, prior to descent and prior to landing.

4.2 Transfer of Aircraft Control in Flight

4.2.1 Both crewmembers must know at all times who has control of the aircraft. Transfer of aircraft control will be made with the statement, "You have the aircraft." Aircrew receiving control of the aircraft will shake the stick and acknowledge, "I have the aircraft." Once a crewmember assumes control of the aircraft, he will maintain control until he relinquishes it, as stated above.

4.2.2 Prior to flight, the Instructor Pilot will brief on who will have the aircraft control during any takeoff, landing, or in-flight emergency.

4.3 Crew Coordination

The AC is responsible for initiating all checklists, as required. The checklist items will be accomplished on a challenge and response basis. The FTE/IP reads the item to be checked and the AC responds with the action accomplished. Remember the FTE is a noncrewmember; AC is responsible for getting the checklist completed.

4.4 Interpretation of AOA Indications

4.4.1 Angle of Attack (AOA) is the angle between the relative wind (flightpath) and the chord of the wing. For any given wing design, the individual angle of attack associated with stall, optimum approach, optimum loiter, optimum cruise, or maximum performance will be constant for each of these items under all conditions of flight: weight, temperature, configuration, altitude, bank, etc., despite the fact that the airspeed may be different under different flight conditions. AOA in the F-4 is measured in arbitrary units - not actual degrees.

4.4.2 The F-4 presents AOA in three forms:

4.4.2.1 On a cockpit gauge in indicated units from 0 to 30. An AOA gauge is installed in the rear cockpit in some aircraft.

4.4.2.2 On indexer lights located on both sides above the instrument panels of both cockpits. Optimum approach AOA (ON SPEED) is indicated by illuminating a "doughnut". Variations from the optimum are indicated by a chevron above the doughnut when the AOA is high, and below the doughnut when it is low.

4.4.2.3 An aural tone indication of AOA. The pulse frequency of the tone and volume increase as AOA increases.

4.4.3 The following are the primary F-4 angles of attack on aircraft without leading edge slats:

4.4.3.1 Approach/Landing - 19.2 units (special marker on AOA gauge at the 3:00 position).

4.4.3.2 Stall Warning - 22.3 units (activates a pedal shaker on the left rudder pedal in the front cockpit, clean or configured).

4.4.3.3 Stall - 26-30 units.

4.4.3.4 Refer to Airspeed Indicator Failure Chart in Section 3, Dash-1, for additional AOA references.

4.4.4 Realize that although AOA is an accurate and extremely useful flight reference, it should be cross-referenced against airspeed and vertical velocity during all phases of flight.

4.4.5 AOA system operation will be available during emergencies on RAT and/or battery power.

5. LANDING

5.1 Typical VFR Traffic Pattern

The following procedures will be followed for a normal 360-degree overhead pattern:

5.1.1 Establish yourself on initial at 300 knots, offset to the north side in accordance with local procedures. Approaching the airfield, visually clear the traffic pattern for conflicting traffic.

5.1.2 Adjust throttles to maintain 300 knots and 3800 feet MSL. Trim the aircraft.

5.1.3 Abeam the desired touchdown point, initiate the pattern break. Roll smoothly into approximately a 60 degree bank turn. Apply back stick pressure to obtain a maximum of 19.2 units of AOA in a level turn. Throughout the turn, the power will normally remain at the value established on initial approach.

5.1.4 Compute an approximate final approach airspeed by adding 2 knots per 1,000 pounds of fuel on board to the approach airspeed for your aircraft model and configuration.

5.1.5 Throughout the turn to downwind, monitor altitude and airspeed. Airspeed should bleed smoothly down to below 250 knots. The control stick will be slowly coming aft as airspeed decreases.

5.1.6 Roll out on downwind, approximately opposite point of touchdown, coordinating rudder and aileron.

CAUTION: IMPROPER USE OF AILERON DURING ROLLOUT CAN INDUCE ADVERSE YAW. DESIRED AIRSPEED IS APPROXIMATELY 220 knots.

5.1.7 After rollout, lower the landing gear and flaps (250 knots maximum). The flap switch has two detents (the second is unused). Try to use only the first detent to avoid confusion when raising the flaps. As the gear and flaps come down, considerable aft trim will be required to maintain level flight.

NOTE: FLAPS MAY NOT EXTEND UNTIL 210 knots.

5.1.8 Maintain level flight at 180 knots minimum on downwind. Check gear and flaps down, anti-skid and warning lights out, and check hydraulic pressures at approximately 3000 pounds before starting the turn to base. The rear seat occupant will confirm that all gear and flaps are down as required.

5.1.9 When the touchdown point is approximately 45 degrees aft of the aircraft, start the base turn. Forty-five degrees can be estimated by looking back parallel to the leading edge of the wing. Roll into a 30-45 degree bank, coordinating turn with rudder, and allow the nose to drop slightly.

5.1.10 Make the base call, "Call sign, base, gear down, touch and go (or full stop)."

TYPICAL TRAFFIC PATTERN

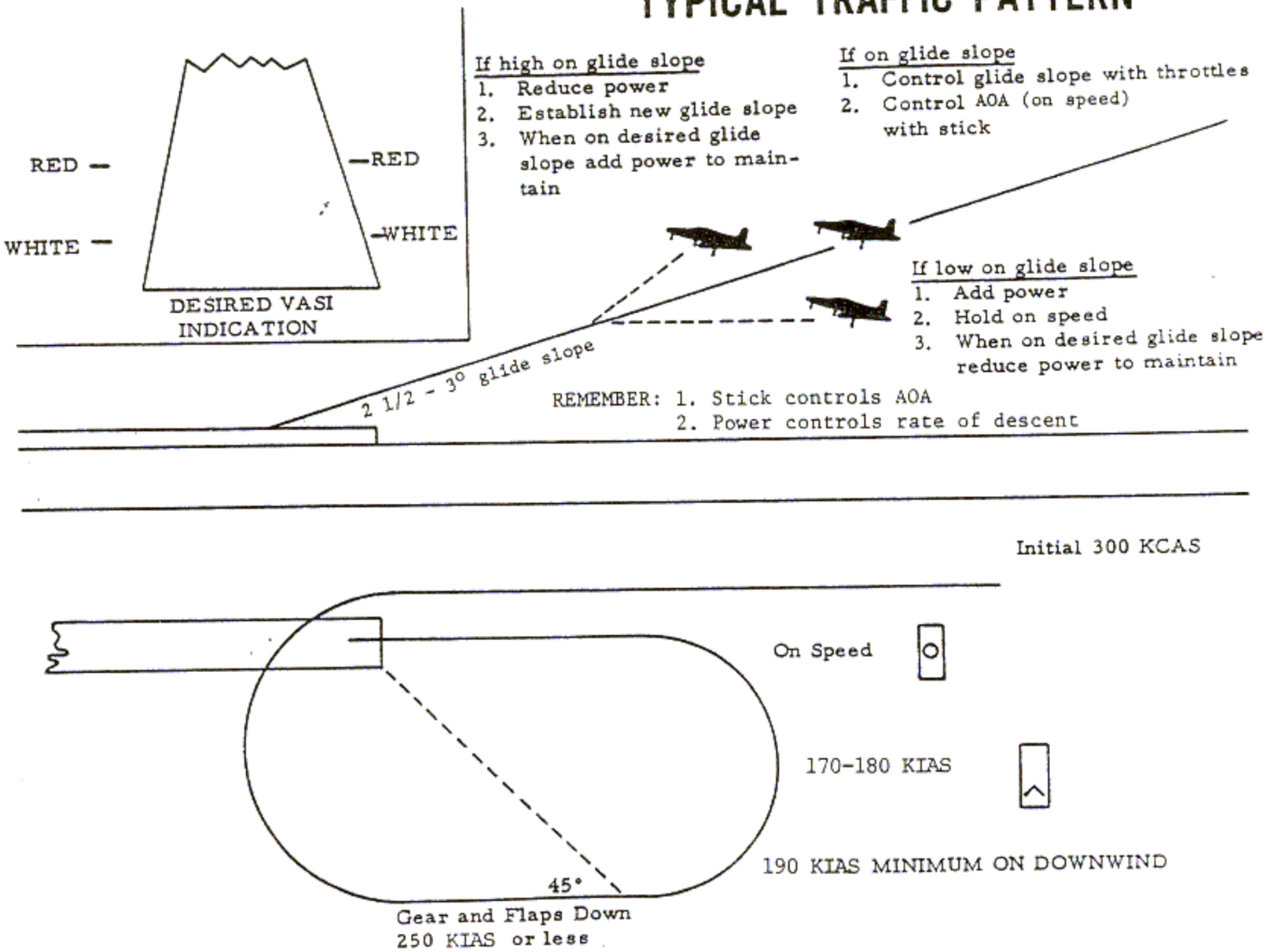

Figure 1

5.1.11 On base with 90 degrees to go, airspeed should be 170-180 knots and no slower than ON SPEED.

5.1.12 On final, you should obtain an ON SPEED indication (19.2 units AOA and doughnut on indexer lights), cross-check the "ON SPEED" AOA indication against computed airspeed for the fuel aboard.

5.1.13 Use rudder and aileron to roll out on final, and a slight power reduction may be required to maintain an ON SPEED indication with the desired flightpath angle.

5.1.14 The VASI lights (if available) may be used during the approach as an effective cross-check to determine optimum glide slope information.

5.1.15 Using power and pitch, control glidepath and AOA as necessary. Remember, pitch controls AOA and power controls glidepath.

5.1.16 Flying a 2 1/2 degree to 3 degree glide slope will produce a rate of descent of about 700 ft/minute. Power changes, once on the glide slope, should be small (plus or minus 2% RPM) with power remaining approximately 83% on both engines.

5.2 Straight-In VFR Approach

The general procedures for flying straight-in approaches are as follows:

5.2.1 Consider fuel, external load, and landing configuration to compute final approach airspeed.

5.2.2 Slow to approximately 230 knots on extended final. Lower the gear and the desired amount of flaps.

5.2.3 Descend to prescribed altitude to intersect the desired glidepath at a comfortable distance from the runway.

5.2.4 Establish the computed final approach airspeed approximately 1-2 miles prior to glidepath interception. Cross-check AOA and airspeed. Once validated, AOA may be used for approach speed control.

5.2.5 Visually, acquire the runway and adjust flightpath to align the aircraft with the runway centerline.

5.2.6 As the glidepath is intercepted, reduce power slightly (1-2% RPM) to establish the final approach.

5.2.7 Cross-check glidepath with VASIs, if available. Red over white is the optimum glidepath.

5.2.8 Use power to control glidepath and pitch to control AOA as necessary.

5.3 Control of Glidepath and Approach Speed

Once on final, the pilot controls the desired flightpath, approach airspeed, and angle of attack by a combination of pitch and power inputs to arrive at the proper touchdown point. Procedures are:

5.3.1 Review the desired approach airspeed and AOA and recall the various displays available. These are the indexer lights, AOA gauge, aural tone, and the airspeed indicator.

5.3.2 Determine the approximate power setting required to hold speed (approximately 83% RPM).

5.3.3 Confirm the configuration as desired, normally gear and full flaps.

5.3.4 Establish the desired glidepath by slowly reducing power and increasing back stick pressure until AOA approaches 19.2 units, and airspeed approaches computed airspeed for gross weight.

5.3.5 If fast (AOA less than 19.2 and airspeed above desired), reduce the power very slowly and compensate for loss of lift by increasing back stick pressure to maintain desired glidepath. This will result in an increase in AOA and a decrease in airspeed.

5.3.6 If slightly slow (AOA between 19.2 and 20.3 units and airspeed approximately 5 knots below desired), gently ease the stick forward to decrease AOA and increase the power to maintain glidepath.

5.3.7 If very slow, it may be necessary to initially lower the nose as the power is increased until a safe airspeed has been achieved and then reestablish the desired glidepath with power and pitch, as necessary.

5.3.8 If below the desired glidepath (VASI lights red over red), increase power and ease back on the stick to maintain AOA at 19.2 units. As the desired glidepath is approached, gently reduce power while maintaining AOA to reestablish flight down the glidepath.

5.3.9 If above the desired glidepath (VASI lights white over white), gently decrease the power to bring the flightpath down to the desired glidepath while maintaining AOA at, or slightly less than, 19.2 units. Approaching glidepath, add power to reestablish while controlling AOA with pitch. Care should be taken to avoid excessive sink rates on short final.

5.4 Go-Around

Make the decision to go around as early as possible and proceed as follows:

5.4.1 Smoothly advance the throttles to military (use afterburner, if necessary).

5.4.2 Adjust pitch to maintain ON-SPEED AOA until altitude begins to increase. This requires leading any preplanned minimum altitudes.

5.4.3 Realize that a touchdown may be necessary during a late go-around and, if so, accelerate on the runway before establishing takeoff attitude. Rotate to takeoff attitude (normally 10 to 12 degrees nose high) after the aircraft accelerates to takeoff airspeed.

5.4.4 Retract the gear when a definite climb has been established, adjusting pitch so as not to exceed 17 units AOA during go-around with gear retracted.

5.4.5 Retract the flaps after reaching a minimum airspeed of 180 knots.

5.4.6 Accelerate to desired airspeed while checking for other traffic. Advise tower of intentions.

NOTE: DO NOT EXCEED 3300 MSL UNTIL PAST THE FIELD BOUNDARY.

5.5 Normal Landing and Rollout

5.5.1 Maintain final approach AOA all the way to touchdown. Unlike other types of aircraft, the F-4 is flown down final approach at touchdown speed. Therefore, the power is held relatively constant to touchdown.

5.5.2 Pitch attitude should be maintained by increasing aft stick pressure during the touchdown. When the aircraft reaches an altitude of 20 to 30 ft above the runway, ground effect will tend to rotate the aircraft nose down. If you have been on glidepath, the only control change will be smoothly moving the stick aft to maintain attitude during touchdown. If you have been high on the glidepath, rate of descent will be high; as a result, some additional power will be necessary to decrease the excessive rate of descent.

NOTE: BOTH CREWMEMBERS SHOULD ASSURE THAT THEY DO NOT HAVE THEIR FEET ON THE BRAKES.

The best way to insure that no pressure is applied prior to landing is to keep your heels on the floor during landing. Even a slight amount of pressure can result in badly worn or blown tires.

5.5.3 At touchdown, retard the throttles to IDLE, and deploy the drag chute. If the drag chute handle returns back to the stowed position after being deployed, the drag chute will jettison on the runway. Do not push the button on the handle during drag chute deployment.

5.5.4 The stick should be held full aft during the landing roll for maximum aerodynamic braking and to transfer as much weight as possible to the main gear. If touchdown was on speed, there will not be enough stabilator effectiveness at touchdown to hold the nose gear off the runway.

5.5.5 Apply brakes as necessary. Remember, the wheels must be up to speed before the anti-skid is effective. Keep off the brakes until time to start braking.

5.5.6 Clear to the turnoff or cold side of the runway as speed/conditions permit.

5.5.7 Slow to taxi speed (below 30 knots), utilizing braking as runway conditions dictate. Turn the anti-skid off when below 30 knots.

5.6 After Landing

5.6.1 Follow the AFTER LANDING Checklist. Nose gear steering should not be engaged until taxi speed, unless necessary to control the aircraft. This is to preclude control problems resulting from possible hard over steering. However, if you need it, use it.

5.6.2 Complete checklist. Important is to account for all loose items prior to opening the canopies. R/C/P crewmember check F/C/P banana links free of loose objects.

5.6.3 Crewmembers WILL NOT unstrap until after both the canopies are open.

5.6.4 Use caution when jettisoning the drag chute. Jettison the drag chute on to the designated area, wind permitting. Excessive power settings will cause the drag chute attaching ring to whip about after jettison, endangering personnel and property in the area.

NOTE: DO NOT TAXI ON THE BLACKTOP AREAS.

5.7 Crosswind Landings

Maximum 90 degree crosswind component for landing is 35 knots. If crosswind exceeds 25 knots, do not use drag chute. The following applies to dry runways:

5.7.1 On final, maintain alignment with runway centerline using the wing low method, crab method, or a combination of the two. In cross-controlled conditions, the AOA will be inaccurate, and airspeed crosscheck becomes more important.

5.7.2 If the crab method is used, rudder should be used to align the aircraft with the runway just prior to touchdown.

5.7.3 After touchdown, use flight controls, nose gear steering, and differential power if necessary, to maintain directional control. Nose gear steering should be initiated with the rudder pedals at, or near, the neutral position. Crosswind effect on the aircraft is not severe.

5.7.4 If drag chute is used, be ready to jettison it if the weather vaning becomes a problem.

NOTE: THE MOST IMPORTANT ASPECT OF DIRECTIONAL CONTROL UNDER CROSSWIND CONDITIONS IS KEEPING THE AIRCRAFT PRECISELY ALIGNED WITH THE RUNWAY.

5.8 Braking Without Anti-skid

5.8.1 Anti-skid braking is highly desirable. If it fails, normal braking requires extreme caution. Many blown tires, incidents, and accidents have occurred due to improper braking techniques, when anti-skid braking was not available.

5.8.2 Anti-skid failure may first be detected when the gear is lowered before landing. If the anti-skid caution light is ON, and the switch is ON, the system is inoperative.

NOTE: THE MASTER CAUTION LIGHT DOES NOT ILLUMINATE IN CONJUNCTION WITH THE ANTI-SKID INOPERATIVE LIGHT.

5.8.3 If the anti-skid has failed, follow the checklist and proceed as follows:

5.8.3.1 Place anti-skid switch OFF.

5.8.3.2 During landing roll, apply brakes slowly, increasing pressure as necessary. If skidding is detected, release and gently reapply brake pressure. As speed decreases, heavier pressure may be applied.

5.8.3.3 If unable to slow to taxi speed prior to the center taxiway, let the aircraft roll out to the end. This is far more preferable to excessive braking that might blow one or both tires, or result in hot brakes.

5.8.3.4 If anti-skid failure is detected during landing roll, release brake pressure before turning anti-skid system off (this will prevent inadvertent blown tires). The quickest and easiest way to momentarily turn anti-skid off is to use the paddle switch on the control stick.

5.8.3.5 If the emergency brakes are used, ensure both crewmembers have their feet off the brakes when the emergency brake system is activated, otherwise, blown tires will result.

5.9 Closed Traffic Pattern

The closed pattern is flown in the following manner:

5.9.1 Maintain military power on the go-around until airspeed is 220-250 knots, then adjust power to approximately 92% RPM.

5.9.2 Notify tower of intentions to include landing intent (closed, full stop, touch and go, etc.).

5.9.3 Establish a positive climb (10-15 degrees) and then bank about 60 degrees toward downwind.

5.9.4 Adjust bank and back stick pressure so as to arrive at 3800 MSL prior to rolling out on downwind.

5.9.5 Adjust power as necessary to roll out at 220 to 250 knots on downwind (approximately 83% RPM).

5.9.6 Opposite point of desired touchdown, configure the aircraft and proceed as with normal landing pattern.

5.10 Landing on Wet or Icy Runways

5.10.1 Before landing, you should:

5.10.1.1 Confirm pitot heat and anti-ice are on, and use the rain removal, if required.

5.10.1.2 Determine chances of actually getting the aircraft stopped on the runway. Consider computed landing roll, runway length, wind, runway slope, and surface condition (RCR). Realize that in adverse conditions, the landing roll can be more than twice that experienced in normal conditions.

5.10.2 Establish yourself on final and follow these procedures:

5.10.2.1 Make a normal approach and touchdown at the proper speed for the gross weight, landing as close to the end of the runway as safely possible.

5.10.2.2 Under crosswind conditions, fly final in a wings level crab with an ON SPEED indication. Fly a slightly steep final (800 fpm) and make a firm touchdown (500 fpm) while maintaining a wings level crab.

5.10.2.3 Immediately upon touchdown, retard throttles to IDLE and deploy drag chute. Maintain full forward stick to increase nosewheel traction.

5.10.2.4 Employ nose gear steering and flight controls as necessary to maintain directional control. Differential power should be used only as a last resort.

5.10.2.5 Be prepared to jettison the drag chute if significant weather vaning is encountered.

5.10.2.6 Use braking as required. For maximum braking, apply sufficient pressure to keep the anti-skid system active (pressure up to, and including, full brake pedal displacement).

CAUTION: AVOID MISTAKING LOW DECELERATION UNDER HIGH SPEED AND ADVERSE RUNWAY CONDITIONS FOR BRAKE OR ANTI-SKID FAILURE.

5.10.2.7 Use nose gear steering to control the possible fishtailing effect. Release brakes and employ maximum nose gear steering and aerodynamic steering, if directional control becomes a major problem.

5.10.2.8 Monitor speed and runway remaining, and prepare for a barrier engagement, if necessary, by extending the tail hook at least 2000 ft prior to the barrier.

5.10.2.9 Remember rubber deposits make wet runways very slippery.

5.10.3 The following "checklist" will help you to make a safe, controlled Wet Runway Crosswind Landing:

Get the gross weight down, if you can

The Approach -- No faster than on speed and
about 800 ft per minute descent

Establish the crab required to track down the runway

Touch down firmly in the crab

Drag Chute -- Be prepared to jettison, if necessary

Tap nose gear steering button, then engage

Control Direction -- Nose gear steering is best

Full anti-skid braking when under control

Hook down, and now you are configured to get the wire

REMEMBER: MINIMIZE THE PROBLEM WITH MINIMUM APPROACH SPEED AND A FIRM TOUCHDOWN.

5.11 Emergency Landing Pattern

Actual emergency patterns must be tailored to the situation, so no two patterns will be identical, but they all have the same objective -- to land the aircraft safely in the first attempt with the minimum amount of risk and, if necessary, to provide opportunity for the aircrew to safely eject. The following is a general guide for emergency patterns:

5.11.1 Confirm descent and before landing checks are complete and proper emergency procedure steps are accomplished while at a safe altitude.

5.11.2 Contact the controlling agency with intentions and position. Include type aircraft, number of souls on board, fuel and ordnance, and nature of problems.

5.11.3 Obtain landing information and weather.

5.11.4 Circumstances permitting, reduce gross weight to minimum practical.

5.11.5 Maintain safe maneuvering airspeed prior to establishing landing configuration.

5.11.6 Plan traffic pattern and entry to avoid abrupt, steep or hard turns, and large or abrupt power changes.

5.11.7 Final should be at least 2-3 miles and a normal 2-3 degrees glidepath should be flown.

5.11.8 When on final, confirm the gear is down and locked, and flaps are as desired.

5.11.9 Consider rotating the command selector valve in the rear cockpit for ejection, if conditions warrant.

5.11.11 For most situations, final approach airspeed will be increased and angle of attack decreased; however in general, you should strive for normal touchdown AOA and a normal touchdown point.

5.11.11 Depressurize the fuel tanks by extending the air refueling door.

NOTE: THE AIRCREW MAY ENCOUNTER A MINOR MALFUNCTION THAT WILL REQUIRE A PATTERN SIMILAR TO AN EMERGENCY PATTERN. HOWEVER, THE SITUATION MAY NOT BE SERIOUS ENOUGH TO DECLARE AN EMERGENCY. IN THIS SITUATION, REQUEST THE TYPE PATTERN DESIRED (STRAIGHT-IN, NO-FLAP, ETC.). IF THE SITUATION IS SERIOUS ENOUGH TO TALK ABOUT OVER THE UHF, YOU SHOULD DECLARE AN EMERGENCY.

5.12 No-Flap Landing

5.12.1 An actual no-flap landing should be made from a straight-in approach, if possible. All practice no-flap patterns will be flown from a straight-in approach or closed pattern to a wide downwind.

5.12.2 For a straight-in approach, plan to establish a minimum of a five-mile wings level final approach. For a closed pattern to a wide downwind, turn base to establish a two to three mile final. Maintain 230 knots minimum until starting the turn to final.

5.12.3 Use caution in turns as you will have no ARI with the flaps up and must use a combination of aileron and rudder for lateral control. Final approach airspeed should be increased approximately 11 knots above normal.

5.12.4 During the base turn and on final approach, fly ON SPEED angle of attack. Your pitch attitude will be higher. Overcontrol of AOA is very easy in a no-flap pattern unless pitch inputs are smooth. Make a normal touchdown. Use caution on a touch-and-go. Any rapid aft stick movements will over rotate the aircraft and scrape the stabilator on the runway.

5.13 Asymmetrical (Split) Flap Landing

Asymmetrical flaps are usually encountered when the flaps are extended in the traffic pattern. If an unusual roll occurs when the flaps are extended, proceed as follows:

5.13.1 Depress and hold the paddle switch while accelerating to above 200 knots and reposition the flap switch.

5.13.2 If a symmetrical condition results, perform a no flap landing.

5.13.3 If flight control problems persist, perform a slow flight controllability check at a safe altitude (minimum 5000 ft AGL).

5.13.4 Land as soon as practical, flying a 17 unit AOA approach.

5.14 Simulated Single Engine Landing

5.14.1 Simulated single engine patterns will be accomplished by reducing power on either engine to idle.

NOTE: AN ACTUAL SINGLE ENGINE LANDING SHOULD BE MADE FROM A STRAIGHT-IN APPROACH.

5.14.2 Plan your final to provide for a five mile wings level final approach. The rest of the pattern is basically the same as a normal landing. Do not over flare the aircraft or reduce thrust significantly prior to touchdown.

5.14.3 Pay particular attention to the airspeed and AOA throughout the pattern. Maintain 250 knots minimum prior to configuring. Maintain 17 units AOA on final (refer to AOA conversion charts in the checklist). A 17 unit approach requires 11 knots airspeed to be added to computed normal approach speed.

5.14.4 Strive for ON SPEED AOA at touchdown. Approximately crossing the end of the overrun, transition to on-speed AOA by reducing power slightly and adding a little back stick pressure.

5.14.5 With heavy fuel weights, do no hesitate to use afterburner if necessary to maintain speed at any time in the pattern. During an actual single engine go-around, it will be necessary to use maximum power.

5.14.6 Always be cognizant of the extreme yaw and roll changes which cannot be controlled if the airspeed is allowed to decrease below Dash-1 recommendations when you are actually faced with a single engine and utility hydraulic failure situation.

5.14.7 During a normal go-around from a simulated single engine approach or touch and go, place both throttles to full military power. Establish a shallow rate of climb and then retract the landing gear and flaps as the aircraft climbs.

5.14.8 After completion of a simulated single engine go-around, place the retarded throttle at full military power before terminating afterburner on the good engine.

5.15 Simulated Engine Failure on Final

Simulated engine failure while on final approach will be demonstrated and practiced during F-4 checkout sorties when an instructor pilot is aboard. The objective is to demonstrate that afterburner thrust is absolutely necessary to solve the thrust required problem and accelerate to either continue the approach at 17 units or complete a single engine go-around. Flaps must remain in the DOWN position. Single engine failure (idle) will be simulated as directed by the IP and only the remaining good engine will be placed in afterburner. Be aware, however, that the F-4 Dash-1 calls for both engines to be placed in A/B during an actual engine failure on final. To adequately and safely demonstrate this type of failure condition, a normal straight-in approach at 19.2 units will be flown. The simulated engine failure will be initiated no lower than 500 ft AGL. The F-4 Dash-1 correctly warns that you should expect to lose altitude during the go-around. You will need to gain approximately 11 knots to convert to a 17-unit approach, so use the afterburner and decrease the angle of attack accordingly. With this transition complete, you may continue the simulated single engine approach or complete a go-around as necessary. Remember to use rudder to maintain wings level and to reduce sideslip, if required.

6. POSTFLIGHT GROUND OPERATIONS

6.1 Hot Brake Procedures

Don't shut down airplane with hot brakes until fire department arrives.

6.2 Shutdown and Leaving Aircraft

Make a postflight check for such things as birdstrikes, lost panels, dragged stabilator, hydraulic leaks, and any obvious discrepancies.

6.3 Loss of Brakes While Taxiing

These procedures will be followed in case of wheel brake or utility hydraulic failure while taxiing:

6.3.1 When loss of braking is detected, recheck that the Anti-skid Switch is off.

6.3.2 Activate the emergency brake system by pulling the T-handle in either cockpit and apply steady brake pressure. Do not taxi further once the aircraft is stopped.

6.3.3 If no emergency braking exists, make a radio call to Ground Control and put the tail hook down to alert ground personnel.

6.3.4 Steer clear of all obstacles.

6.3.5 If nosewheel steering is not available, or a collision is imminent, shut down immediately, and egress the aircraft as necessary.

6.4 Shutdown After Emergency Landing

6.4.1 Follow the Checklist for the appropriate emergency.

6.4.2 If aircraft directional control is not available, have the down locks installed and shut down the aircraft.

6.4.3 If an unsafe gear condition exists, a lakebed landing is preferred. Stop the aircraft on the runway/lakebed and have downlocks installed.

6.4.4 If a fire or other hazardous-to-aircrew condition exists, bring the aircraft to a complete stop. Notify ground control, shut down, and evacuate the aircraft as soon as possible.

7. TRANSITION MANEUVERS AND AEROBATICS

There are several special maneuvers that are designed to familiarize pilots with the characteristics of the aircraft. Most of these maneuvers are common for transitioning into any fighter aircraft and are important to the learning process. Transition maneuvers and exercises acquaint the aircrew with the aircraft feel, normal and unusual characteristics, and instrumentation. Precision, in accomplishing these maneuvers, is a must.

7.1 Rig/Stab Aug Check

This check is in two parts. The Rig Check should be performed on every flight. In addition, the Stab Aug Check should be performed prior to maximum performance maneuvering (confidence maneuvers, advanced handling, stalls). The Rig Check will be performed at 350 knots.

7.1.1 With all axes of the Stab Aug engaged, trim the rudder to center the ball in the rear cockpit.

7.1.2 Trim the aircraft for straight and level flight. Rolling moments of one to two degrees per second may be disregarded.

7.1.3 If a large amount of lateral trim is required to maintain wings level (i.e., more than 1" aileron down at 350 knots), an out-of-rig condition, malfunctioning stab aug, or asymmetrical load exists. The aircraft will not be maneuvered at high angles of attack if this condition is indicated, and a straight-in landing will be accomplished.

7.1.4 The Rig Check must be performed on an aircraft with external tanks after the tanks are dry. Leaving the external tanks selected until the fuel reading is 6.5/10.5 will give a more forward CG for high AOA maneuvers.

7.2 Stab Aug

7.2.1 Performed after completion of a satisfactory Rig Check. The check is to ensure that the stab aug will dampen oscillations and will be performed prior to maximum performance maneuvering. With all axes of the stab aug engaged (The order of these checks is unimportant):

7.2.1.1 Pull the nose up with a 2G force and release the controls. Aircraft should stabilize in one cycle.

7.2.1.2 Yaw the aircraft one ball width and release controls. Aircraft should stabilize in one cycle. Repeat in opposite direction.

7.2.1.3 Roll to 30-45 degrees of bank and release control pressure. Aircraft should maintain attitude. Roll wings level and release control pressure. Aircraft should again maintain attitude. (This checks both roll aug channels.)

7.2.2 Maximum performance maneuvering will not be performed if the stab aug does not adequately dampen aircraft oscillations.

7.2.3 The roll channel of the stab aug will be disengaged for aerobatics, high angle of attack maneuvers, approach to stalls, confidence maneuvers, and maneuvers in which rudder rolls or reversals will be accomplished.

7.3 Approach to Stalls

Approach to stalls will be performed only with an Instructor Pilot aboard the aircraft and an operational AOA gauge in both cockpits. (Except as designated on curriculum mission.)

NOTE: A MAXIMUM OF 25 UNITS AOA, NOSE RISE, NOSE SLICE,OR 30 DEGREES WING ROCK WILL NOT BE EXCEEDED IN STALL DEMONSTRATION MANEUVERS. WING ROCK LIMITS ARE 15 DEGREES FOR APPROACH TO ACCELERATED STALLS. ALL APPROACHES TO A STALL, EXCEPT FOR LANDING CONFIGURATION, WILL BE ENTERED AT 15,000 FT AGL OR ABOVE. LANDING CONFIGURATION APPROACH TO A STALL WILL BE ENTERED AT A MAXIMUM OF 18,000 FT MSL. IF CARRIED, EXTERNAL TANKS WILL BE EMPTY BEFORE PERFORMING STALLS. A RIG STAB AUG CHECK WILL BE ACCOMPLISHED AND THE ROLL AUG TURNED OFF PRIOR TO PERFORMING STALLS.

7.4 Approach to 1 G Stall -- Clean

Normal 1 G stalls are generally preceded by a wide band of buffet warning; however, in F-4E aircraft, buffet intensity is reduced slightly at all angles of attack compared to the F-4C/D. The approach to 1 G stall is accomplished as follows:

7.4.1 Establish 200 knots, adjust power to approximately 80-85% RPM and allow the aircraft to decelerate in straight and level flight.

7.4.2 Onset buffet normally occurs approximately 40 knots above the stall at about 14 units angle of attack and increases from moderate to heavy buffet preceding the stall. However, a reduction in buffet level near the stall is possible and a complete absence of buffet has been experienced during some 1 G stalls.

7.4.3 The rudder pedal shaker will activate at 22.3 units angle of attack; however, it may not be recognizable due to airframe buffet.

7.4.4 Wing rock is unpredictable, but starts about 10 knots prior to the stall and can progress to as much as 30 degrees of bank at the stall. If aileron and rudder inputs are avoided during any type of stall or stall approach, wing rock onset may be delayed or may not be encountered at all.

NOTE: DO NOT ATTEMPT TO COUNTER ROLL WITH OPPOSITE AILERON DURING WING ROCK. WHEN CLOSE TO OR AT THE STALL, USE OF AILERONS WILL AGGRAVATE THE YAWING MOTION. YOU WILL MOST PROBABLY BE OUT OF PHASE WITH YOUR CONTROL INPUTS AND WILL EXPERIENCE ADVERSE YAW.

7.4.5 The stall is characterized by a yawing (nose slicing) motion in either direction. The nose slicing is caused by a loss of directional

stability. If nose slicing is experienced, recovery should be initiated immediately to prevent departure from controlled flight and subsequent spin entry.

7.4.6 As the AOA increases, the stick force required to hold the pitch attitude decreases. Increases in AOA move the center of lift forward on the wing (closer to the CG) and stability is reduced. This is nose rise or stick force lightening.

7.4.7 Terminate at nose rise, nose slice, or 30 degrees wing rock, whichever occurs first. In order to accurately observe stall indications other than AOA, it is necessary to closely observe cues outside the cockpit. If no indications of stall occur by 25 units AOA, initiate recovery.

7.4.8 Recovery, if initiated rapidly, is effected by positioning the stick forward of neutral (3-8 units AOA), maintaining neutral ailerons and rudder, and advancing the power to military (afterburner, if necessary). Wing rock may continue during recovery until the AOA is reduced to below 15-20 units.

7.4.9 The characteristics of the stall, particularly in the F-4E, including the onset of buffet, buffet intensities, degree of wing rock, stick forces and violence of the stall itself are dependent upon the loading, center of gravity position, and control technique and are not entirely predictable or repeatable.

7.4.10 After attaining flying airspeed (250 knots), recover the aircraft to straight and level flight.

7.5 Approach to Landing Configuration Stalls.

Approaches to stalls in the landing configuration are safe, with satisfactory control about all axes up to 24 to 25 units angle of attack, except at aft CG positions where sensitive pitch control is experienced. The landing configuration stall is approached as follows:

7.5.1 At an altitude below 18,000 ft MSL and above 7000 ft AGL, establish landing configurations, gear and flaps down.

7.5.2 Slow the aircraft to final approach airspeed, 19.2 units AOA, and set up a descent of between 500 and 1000 feet per minute.

7.5.3 Increasing pitch attitude will cause an increase in AOA which, if continued, will ultimately result in departure from controlled flight.

7.5.4 This procedure is simulating final approach and recovery should be initiated at the first positive sign of an impending stall. This occurs at 22.3 units in the form of a rudder pedal shaker.

7.5.5 However, if AOA is allowed to increase beyond 22.3 units, wing rock is normally encountered and can increase to ±30 degrees.

7.5.6 There is virtually no increase in airframe buffet in the landing configuration and only light to moderate buffet will be encountered

at the stall. Therefore, buffet is not an indication of stall in the landing configuration.

7.5.7 Nose rise will occur as the aircraft is approaching the stall.

7.5.8 Nose slicing can occur as low as 26 units AOA and may be the first indication of loss of control.

7.5.9 Initiate recovery at the rudder pedal shaker (if you fail to note the pedal shaker recover at nose slice, nose rise or 30 degree wing rock). Neutralize aileron and rudder, position the stick forward to reduce AOA, and advance the throttles to maximum thrust to minimize altitude loss.

7.5.10 When airspeed begins to increase, establish on speed AOA and a positive rate of climb.

NOTE: IF THE AIRCRAFT STALLS, IT MAY RECOVER AS LOW AS 30 DEGREES NOSE DOWN, AND CARE SHOULD BE TAKEN NOT TO EXCEED 250 knots WITH THE GEAR DOWN.

7.5.11 Landing configuration stalls may also be practiced in turns, simulating the base to final turn.

7.5.12 Establish landing configuration and at 190-200 knots, roll into 45 degree bank and start a descent.

7.5.13 Add back pressure to increase AOA until the rudder pedal shaker. Note the airspeed when you reach 22.3 units and then recover.

7.5.14 Recovery from landing configuration stalls should be done rapidly but smoothly.

7.6 Approach to Accelerated Stall

7.6.1 Pilots have encountered accelerated stalls in the following phases of flight:

7.6.1.1 Landing - break from initial to downwind.

7.6.1.2 Air-to-ground gunnery - rolling in and pulling off.

7.6.1.3 Air-to-air intercepts - high altitude snap-ups.

7.6.1.4 ACM - defensive and offensive turns.

7.6.2 An accelerated stall can be encountered at almost any airspeed and altitude by attempting to exceed the lift capability of the aircraft. To demonstrate accelerated stall characteristics, use the following techniques:

7.6.2.1 Establish airspeed between 350-400 knots with full military power.

7.6.2.2 Roll into a slightly nose low turn of approximately 90 degrees bank.

7.6.2.3 Apply steadily increasing back stick pressure. Keep the ailerons neutral!

7.6.2.4 Airframe buffet will be very apparent and will increase through moderate to heavy buffet, prior to the stall.

7.6.2.5 Wing rock is not always present but generally starts around 22-25 units AOA. (Wing rock may start as low as 19-20 units AOA.)

7.6.2.6 Terminate at nose rise, nose slice, 25 units AOA, or 15 degrees wing rock, whichever occurs first. In order to accurately observe stall indications other than AOA, devote most of your attention to cues outside the cockpit. If no indications of stall occur by 25 units AOA, initiate recovery.

7.6.2.7 Recover the aircraft by smoothly moving the stick forward with neutral ailerons and rudder. Move the stick forward positively until AOA is at, or slightly below, 19.2 units and the aircraft is flying again, then reestablish ON SPEED. It is not necessary to completely unload, but AOA must be reduced with sufficient forward stick movement.

WARNING: RAPID APPLICATION OF AFT STICK MAY RESULT IN IMMEDIATE HEAVY BUFFET AND DEPARTURE WITH NO OTHER STALL WARNINGS.

There are a few points to remember while doing high angle of attack maneuvers, slow flight, and approaches to stalls. SMOOTHNESS OF CONTROLS IS MOST IMPORTANT. Abrupt stick movements can rapidly put the aircraft into a stall, yaw , and ensuing spin even starting at high airspeeds. Remember that full forward stick will break your positive angle of attack stall but may put you into a negative angle of attack stall. This will be indicated by moderate buffet, sustained negative G, and a zero units AOA indication.

If you are in a stall or near stall, the most important step for recovery is to place the stick forward to unload the aircraft and obtain approximately 1/4G, normally 3 to 8 units AOA. (AOA will give an erroneous indication when large roll/yaw oscillations are present.) NEUTRALIZE AILERON AND RUDDER. A wing low, nose high attitude is not hazardous. At 3 to 8 units, the nose will fall through the horizon and as the airspeed increases to a safe flying speed (250 knots), you can easily fly out of any resultant attitude.

NOTE: INSTRUMENT ERRORS AND/OR LAG OR OUT-OF-RIG CONDITIONS MAY BE PRESENT IN SOME AIRCRAFT. CONSEQUENTLY, THE FIRST WARNING OR INDICATION OF IMPENDING STALL (WING ROCK, NOSE RISE, ETC.) SHOULD BE USED AS RECOVERY CRITERIA.

7.7 RAT Operation (Except F-4E Aircraft)

7.7.1 When either or both generators have failed (and will not reset) or with a single engine failure, it is important to insure the RAT is extended to provide emergency electrical power. The RAT can be extended up to 515 knots or 1.1 Mach number at 0 to 3.0 Gs. To extend the RAT, the RAT handle in the forward cockpit is pushed down to RAT OUT. Pneumatic pressure extends and retracts the RAT. During the single engine shutdown and airstart demonstration, be sure the RAT is extended prior to engine shutdown. There is no harm in putting the RAT out when experiencing electrical difficulties, so use it accordingly. Remember, if an electrical fire or equipment cooling turbine failure is suspected, you can always extend the RAT and turn off both generators to stabilize the situation and gain time to refer to the checklist, find circuit breakers, etc. If you do this, also remember to disengage the stab augs prior to cycling the right generator and if you are IMC, electrical power interruptions may affect your attitude gyros. Also, RAT only electrical power may dump your INS. AHRS attitude will be available by switching the reference system selector switch to STBY.

7.7.2 When cleared by the IP, extend the RAT, turn OFF the right generator and check the BUS TIE OPEN light out. Note and discuss any unusual indications or warning lights. Below 25,000 ft MSL and above 10,000 ft AGL, turn OFF the left generator and note what electrical systems are lost.

7.7.2.1 Loss of cabin pressure.

7.7.2.2 VOR bearing and TACAN.

7.7.2.3 Flight instrument indications and OFF flags, hydraulic pressure, etc.

7.7.3 Following this, turn the stab augs OFF, reset one of the main generators and check the BUS TIE OPEN remains out. In this configuration proceed with the engine shutdown demonstration or reset the remaining generator and retract the RAT. When normal electrical operations are restored reset the stab augs, then check all circuit breakers and warning lights before continuation of the mission.

7.8 Single Engine Operation

During the TPS F-4 checkout program, an engine shutdown, single engine AB light, and airstart will be accomplished only when supervised by an IP aboard the aircraft.

7.8.1 Shutdown. Level off at or above 20,000 ft MSL. Prior to shutting down an engine, turn off the corresponding generator and insure the BUS TIE OPEN light is out. Following this, ensure the RAT is out and operating, and no other aircraft problems exist. When cleared by the IP, move the selected throttle to idle and allow the EGT to stabilize then select cutoff and observe engine instruments, spool down time and minimum RPM.

7.8.2 Burner Light. Slow the aircraft to 19.2 units in level flight and use power as required to stabilize. When "ON SPEED", initiate the AB and

note the excess thrust and aircraft response. Accelerate to 250 knots by descending and note inoperative engine RPM and EGT.

7.8.3 Airstart. Ensure the airspeed is greater than 0.4 Mach number. Then, depress the ignition button and bring the throttle to idle. Observe the fuel flow and advance the throttle until fuel flow is noted. Monitor the engine instruments for indications of a successful relight. To clean up the aircraft, reset the generator (stab augs OFF for right generator) and retract the RAT.

7.9 Slow Flight and Indexer Light Orientation

7.9.1 Start the exercise at 18,000 ft MSL or below. Adjust power as necessary to decelerate to gear and flap lowering airspeeds. Lower the gear and flaps and then continue to decelerate to an ON SPEED indication. Hold ON SPEED in straight and level flight by adjusting power and proceed as follows:

7.9.1.2 Start a level turn. Note that the turn produces a SLOW SPEED indication due to loss of effective lift, and that the angle of attack has increased beyond an ON SPEED indication.

7.9.1.3 Remember that you can get an ON SPEED indication going almost straight up or down. To have a meaningful indication, you must combine the ON SPEED light with the proper glidepath.

7.9.2 To demonstrate what can happen with an improper glidepath, adjust the throttles to maintain ON SPEED indication in level flight and note the airspeed (140-150 knots):

7.9.2.1 Rapidly retard throttles to IDLE and slowly lower the nose to maintain the ON SPEED indication maintained by decreasing G loading on the aircraft. Note the minimum airspeed (120-130 knots).

7.9.2.2 When the nose gets 10-20 degrees below the horizon, the airspeed will start increasing. Smoothly advance the throttles to 100% and raise the nose to maintain the ON SPEED indication with a small amount of positive Gs.

7.9.2.3 Recover from the maneuver when the aircraft nose is 10 degrees above the horizon. Note the maximum airspeed (170-180 knots).

7.10 Chandelles and Lazy Eights

The purpose of practicing Chandelles and Lazy Eights is to demonstrate the high and low speed handling characteristics of the aircraft. Rudder requirements and effects are the major differences that will be noted between the F-4 and the T-38. As in any aircraft, coordinated flight is essential. A cross-check of turn and bank indications is necessary in the learning stages to determine the amount of rudder required as airspeed changes.

7.10.1 Lazy Eight Procedures

7.10.1.1 Adjust the power to 90% clean, 92% with tanks.

7.10.1.2 Align yourself with a straight road or other reference point off your wing in the direction of the turn.

7.10.1.3 Attain 450 knots in a shallow dive and then pull the nose of the aircraft 10-15 degrees above the horizon and smoothly initiate a slow turn. Continue to raise the nose and increase the bank.

7.10.1.4 As the nose passes through 45 degrees of turn, it should be approximately 45 degrees above the horizon with 45 degrees of bank.

7.10.1.5 Continue increasing bank while letting the nose come down to pass through the horizon at the 90 degree point with 90 degrees of bank. Airspeed should be between 200 and 230 knots. During this portion of the Lazy Eight, it may be necessary to relax back stick pressure to prevent turning past the 90 degree point before the nose is down to the horizon. Rudder must be used to control the nose movement.

7.10.1.6 The pitch and roll attitude should change constantly throughout the maneuver (the key to Lazy 8).

7.10.1.7 Begin decreasing the bank after passing through the horizon at the 90-degree point and allow the nose to continue down.

7.10.1.8 Passing through 135 degrees of turn, the pitch should be approximately 45 degrees below the horizon with 45 degrees of bank.

7.10.1.9 Continue decreasing the bank and raise the nose until it is 10-15 degrees below the horizon at the 180 degree point with 450 knots. Wings should be passing thru level as nose passes thru horizon.

7.10.1.10 Perform the remaining half of the Lazy Eight in the opposite direction.

7.10.1.11 Practice Lazy Eights, concentrating on smoothness of controls, and don't be jerky trying to hit exact points.

7.10.2 Chandelles. The Chandelle is an altitude gaining maneuver that may be accomplished with wide variations of G force and climb attitudes. It is recommended that the Chandelle initially be performed at approximately 3 Gs until some degree of proficiency is attained. The nose of the aircraft should continue to climb throughout the maneuver (pitch attitude constantly and uniformly increasing). Attempt to gain the maximum altitude possible:

7.10.2.1 Attain 450 knots in a shallow dive (10-15 degrees).

7.10.2.2 Adjust power to 90% clean, 92% with tanks.

7.10.2.3 Roll in bank at a constant rate while increasing back stick pressure (to approximately 3 Gs).

7.10.2.4 Attain 60 degrees of bank as the nose passes through the horizon at 45 degrees of turn. Maintain 60 degrees of bank until reaching 135 degrees of turn.

7.10.2.5 Begin decreasing bank slowly after the 135 degree point. The roll rate should be planned to bring the wings level with the nose high as 180 degrees of turn is achieved.

7.10.2.6 Recovery will be initiated at 200 knots by advancing the throttles to military power and unloading the aircraft to 3-8 units AOA (approximately 1/4 G).

7.11 Restrictions for Aerobatics

7.11.1 All maneuvers will be performed no lower than 5000 ft AGL.

7.11.2 The Roll Stab Aug will be disengaged when performing these maneuvers.

7.11.3 Rig/Stab Aug Check, as defined earlier, will be performed prior to engaging in aerobatics.

7.11.4 External tanks, if carried, will be empty.

7.12 Barrel Roll

Rate of roll should be constant throughout the barrel roll and the nose should describe a circle around the reference point. Practice Barrel Rolls as follows:

7.12.1 Attain 300-450 knots in a shallow dive, approximately 15 degrees, and select an initial reference point straight ahead.

7.12.2 Adjust power from 90% to full military and clear the area.

7.12.3 Begin a slow coordinated turn in either direction, aiming 20-30 degrees away from the reference point. Begin a steady pull to the horizon, controlling the bank to have wings level as the aircraft passes through the horizon.

7.12.4 Continue to pull the nose up and to increase the angle of bank in order to have 90 degrees of bank above the reference point.

7.12.5 As the maneuver continues, back pressure should be reduced as the aircraft rolls through the inverted attitude.

7.12.6 Back pressure should be reapplied and top rudder used as necessary to keep from "dishing out." The maneuver will be completed when the wings are level and the aircraft is in level flight with the nose 20-30 degrees from the initial reference point.

7.13 Loop

The Loop, Immelmann, and Cuban Eight are all similar maneuvers. Practice the loop as follows:

7.13.1 Clear the area and align the aircraft with a road or note the heading on the HSI.

7.13.2 Accelerate to minimum entry airspeed of 500 knots and full military power (450 knots if you are doing the loop in afterburner).

7.13.3 Smoothly apply back stick pressure to obtain four to five Gs. Maintain wings level by outside references or by the attitude indicator.

7.13.4 By maintaining Gs as the airspeed bleeds off, angle of attack will increase until the aircraft enters into light buffet. At the first indication of buffet, slowly ease off the back pressure to maintain light buffet over-the-top. Use rudders for roll corrections. Do not use ailerons because of adverse yaw. Airspeed across the top should be approximately 200 knots (no slower than ON SPEED).

7.13.5 As the aircraft approaches the inverted position, tip your head back to pick up your ground reference line. As the nose passes through the horizon in the inverted position, maintain light buffet until airspeed increases to approximately 300 knots. Allow the G to increase four to five.

7.13.6 Play the pullout to obtain entry airspeed in straight and level flight.

7.14 Immelmann

The Immelmann is initiated in the same manner as the loop, except:

7.14.1 As the nose reaches a point 10 degrees above the horizon in the inverted position, relax back pressure and begin a coordinated roll in either direction.

7.14.2 The nose will slide down to the horizon during the roll and you will finish in a level flight attitude, traveling 180 degrees to the original direction of the flight.

7.14.3 Make the roll unloaded and use a combination of aileron and rudder to prevent adverse yaw.

NOTE: IF AIRSPEED AT THE 10-DEGREE NOSE HIGH POSITION IS LESS THAN 200 knots, DO NOT COMPLETE THE MANEUVER, INSTEAD, CONTINUE TO PULL THE NOSE DOWN AND SET UP THE MANEUVER AGAIN.

7.15 Cuban Eight

The Cuban Eight is entered in the same manner as the Loop:

7.15.1 When the aircraft has passed over the top and is inverted with the nose 45 degrees below the horizon, unload and roll the aircraft upright holding the nose on a reference point.

7.15.2 Initiate a pullout to arrive wings level with the entry airspeed of 500 knots.

7.15.3 Continue through a second loop and perform the same roll, except in the opposite direction, and recover as specified above.

7.16 Cloverleaf

7.16.1 Adjust power to Military.

7.16.2 Pick a point 90 degrees off the nose in the intended direction of turn while accelerating to 450 knots entry airspeed:

7.16.2.1 Initiate a smooth 3G pullup with wings level until reaching 45-60 degrees nose high attitude.

7.16.2.2 Start a coordinated roll in the direction of the 90 degree point. The rate of roll should be planned so as to reach a wings level inverted position at approximately 200 knots with the nose on the horizon at the 90 degree point.

7.16.2.3 Continue the maneuver as in the back side of a loop, playing the Gs to arrive at entry airspeed and wings level.

7.16.2.4 Continue as desired with repetitive leaves of the cloverleaf performed in the same manner.

7.17 Split-S

The Split-S is a maneuver designed to develop your skill in recovering from a nose low attitude, low or high airspeed. If you find yourself in a diving situation at low altitude, knowing the optimum recovery technique may make the difference between success and failure.

7.17.1 Minimum entry altitude is 15,000 ft AGL.

7.17.2 Entry airspeed is variable with power between Military and Idle. During maneuver, establish and maintain 270-300 knots, using both power and speedbrakes.

7.17.3 Roll inverted and pull straight through in the vertical plane.

7.17.4 Obtain and maintain 19.2 units AOA until reaching G limits, then maintain maximum allowable G.

7.17.5 Insure ailerons are neutral during the pull to prevent adverse yaw. Use rudder to control bank angle.

7.17.6 Smoothly, but rapidly, apply back stick pressure to attain desired AOA at the start of the maneuver without pulling in excess of 19.2 units.

7.18 Confidence Maneuvers

7.18.1 The objectives of the F-4 confidence maneuvers are to demonstrate the low speed capabilities of the aircraft and to indicate correct control techniques at low airspeeds. The result should be increased confidence in your ability to control the aircraft. A Rig/Stab Aug Check will be completed, and the roll aug turned off prior to performing confidence maneuvers. The minimum altitude for initiating the recovery/roll portion of maneuver is 15,000 ft AGL. External tanks, if carried, will be empty.

7.18.2 These maneuvers are designed to show the handling characteristics of the F-4 at airspeeds in the 100 to 200 knots range. While performing confidence maneuvers, devote your attention to outside cues and concentrate on flying the aircraft by feel. AOA references are included, but should be used as a cross-check and not a primary indication of aircraft performance.

7.19 Angle of Attack Recovery

The maneuver is initiated at 300 knots or above:

7.19.1 Establish and maintain a 45 to 60 degree climb while simultaneously advancing the throttles to Military power.

7.19.2 When the airspeed reaches 200 knots, establish and maintain 3-8 units AOA (approximately 1/4G), while holding the ailerons in a neutral position. Disregard bank attitude of the aircraft and concentrate on holding a pitch rate which produces 3-8 units AOA.

7.19.3 Concentrate on maintaining a light feeling in the seat and don't "chase" the AOA needle. Considerable lag will be evident in the AOA gauge on the initial unload.

7.19.4 Upon regaining sufficient flying speed (approximately 250 knots), a normal recovery will then be initiated by applying sufficient back stick pressure to bring the nose back up and attain entry airspeed for the next maneuver.

NOTE: REMEMBER THAT EXCESSIVE FORWARD STICK MOVEMENT COULD INDUCE A NEGATIVE G STALL.

7.20 Low Angle of Attack Roll (Aileron Roll)

Establish the same entry parameters as in the angle of attack recovery:

7.20.1 After establishing a light feeling in the seat (3-8 units AOA), roll the aircraft 360 degrees with smooth application of aileron. In this maneuver, aileron alone controls rate of roll.

7.20.2 Upon reaching an upright attitude, continue to maintain the light feeling (3-8 units AOA), until sufficient flying speed is regained (approximately 250 knots). Initiate recovery.

NOTE: THE ROLL COULD BE STOPPED AT ANY POINT, AND THE AIRCRAFT WOULD STILL RECOVER AT 3-8 UNITS AOA.

7.21 Low Angle of Attack Half Roll (Inverted Recovery)

Establish the same entry parameters as in the angle of attack recovery:

7.21.1 After establishing a light feeling in the seat (3-8 units AOA), roll the aircraft 180 degrees with smooth application of aileron.

7.21.2 Upon reaching an inverted attitude, continue to maintain the light feeling (3-8 units AOA) until sufficient flying speed is regained (approximately 250 knots). Eight units AOA will expedite the recovery.

7.21.3 When the aircraft nose reaches the horizon, roll the aircraft upright and initiate a normal recovery.

NOTE: BECAUSE GRAVITY IS INCREASING YOUR EFFECTIVE RADIAL G, THE RECOVERY IN THE INVERTED POSITION WILL BE MORE RAPID THAN THE AOA RECOVERY IN AN UPRIGHT POSITION.

7.22 High Angle of Attack Roll (Rudder Roll)

The high AOA roll demonstrates the handling characteristics of the F-4 at low airspeeds and high AOA. A good roll is achieved by smooth application of flight controls. Close attention is required to prevent inadvertent AOA overshoots. Remember that AOA can be directly controlled by stabilator inputs. Also, remember that at high AOA, aileron inputs result in adverse yaw. The following procedures should be followed when performing high angle of attack rolls:

7.22.1 Enter at a minimum of 300 knots.

7.22.2 Establish and maintain a 30 degree climb while simultaneously advancing both throttles to Military power. As the airspeed reaches 200 knots AOA will be 10-15 units.

7.22.3 When reaching 200 knots, apply rudder to initiate a 360 degree roll. Vary back stick as necessary to maintain a light burble (approximately 16-18 units AOA).

7.22.4 Once the roll is initiated with rudder, vary back pressure on the stick as necessary to maintain the desired feel (approximately 16-18 units AOA). Hold the ailerons in a neutral position during the roll.

7.22.5 Upon completion of the rudder roll, stop the roll rate with opposite rudder and establish 3-8 units AOA (holding the ailerons neutral) until sufficient flying speed is regained (approximately 250 knots). A normal recovery will then be initiated.

NOTE: THE ROLL COULD BE STOPPED AT ANY POSITION AND THEN A RECOVERY AT 3-8 UNITS AOA ACCOMPLISHED.

7.23 High Speed Dive Recovery

Practice the high speed dive recovery as follows:

7.23.1 Lower the nose to attain approximately a 50 degree dive angle and allow airspeed to build to 450 knots.

7.23.2 Initiate pullout by rolling wings level and smoothly applying back stick to attain the G limit. Simultaneously reduce thrust to idle and open speed brakes.

7.23.3 As the airspeed falls below 400 knots, hold 19.2 units AOA (18 units for aircraft not equipped with operable aural tone) until the pullout is complete. Do not allow airspeed to decrease below 300 knots. (Add thrust and close S/B as necessary).

7.23.4 Do not exceed AOA or G limitations during recovery.

7.24 VFR Unusual Attitude Recovery

During your flying, you may find yourself in a nose high, low airspeed (below 200 knots) attitude. If you are not sure of your attitude, immediately refer to the gauges, establish 3-8 units AOA (light feeling in the seat), and complete an instrument unusual attitude recovery. However, if you are positive of your attitude and wish to rapidly recover the aircraft to set up for the next maneuver, use the following recovery:

7.24.1 Relax back stick pressure to obtain 3-8 units AOA.

7.24.2 Roll the aircraft to the inverted position.

7.24.3 Using approximately 14-16 units AOA (slight buffet), pull the nose back below the horizon.

7.24.4 At 250 knots, roll the aircraft upright and set up for subsequent maneuvering.

NOTE: BE POSITIVE OF YOUR ATTITUDE BEFORE INITIATING THIS TYPE RECOVERY.

7.25 Acceleration Maneuver

The purpose of this maneuver is to demonstrate the most rapid and efficient way to accelerate. The object is to have maximum thrust and minimum drag. Maneuver may be performed at any altitude and airspeed. Following is a suggested method of demonstrating the maneuver:

7.25.1 Simultaneously reduce drag by unloading the aircraft to near zero G (approximately 3 units) and select full afterburner.

7.25.2 The maneuver should be practiced from a variety of flight attitudes. Comparison should be made between rate of airspeed increase versus altitude lost and nose low position.

7.25.3 Accelerate to desired airspeed.

Do NOT exceed stores limitations.

Do NOT go supersonic unless in an authorized area.

7.25.4 Terminate the maneuver when the desired airspeed for the next maneuver is attained.

7.26 High Speed Rudder Reversals

The purpose of this maneuver is to demonstrate the rolling capability of the F-4 when using rudder at high speed and at high angle of attack. As you've seen during confidence maneuvers, when the AOA is above approximately 15 units, the rudder is very effective for generating roll. This is also true at high airspeed. Complete the Rig/Stab Aug check and turn the ROLL AUG OFF. Begin the maneuver above 15,000 ft AGL at 350-400 knots. Simultaneously establish a loaded 3-4.5 G level turn and use Military thrust (afterburner may be used to maintain energy state). When the AOA is between 15 and 19.2 units, push smoothly on the top rudder to reverse the direction of turn. Up to full rudder may be used if inputs are smooth. Concentrate on keeping the ailerons neutral. Rolling underneath with bottom rudder should also be practiced when airspeed has decayed below 300-350 knots. A series of reversals can be practiced using only rudder for roll control and longitudinal stick to track 19.2 units/on speed. Do not descend below 10,000 ft AGL during subsequent reversals. Observe the rudder force gradient change when the airspeed decays below 250 knots.

NOTE: WHEN DECELERATING THROUGH 250-230 KNOTS, THE RUDDER FORCE GRADIENT WILL SWITCH FROM HIGH TO LOW, 11.5 TO 2.6 POUNDS PER DEGREE OF RUDDER DEFLECTION. IF MANEUVERING WITH RUDDER AND THIS OCCURS, BE AWARE THAT AN EXCESSIVE SIDESLIP AND AOA BUILDUP CAN OCCUR.

7.27 Low Altitude, High Speed Flight

A thorough investigation of the aircraft handling qualities in the low altitude, high speed flight regime (below 15,000 ft, 475 KIAS to 0.95M) will be made before a pilot performs an afterburner check climb or other high "g" low altitude flight. No max check climbs will be accomplished on CF-1.

8. BASIC FORMATION

8.1 Standard Visual Signals (AFR 60-15)

Use visual signals for daytime communication, whenever possible. Pilots in formation will relay visual signals; the leader should allow enough time to relay each signal after it is given. All Aircraft Commanders will note affirmative as soon as they understand and are ready to perform the action required:

8.1.1 SIGNAL OF EXECUTION: Nod head. This signal is given one or two seconds following a preparatory signal.

8.1.2 AFTERBURNER IN OR OUT: Move clenched fist inboard or outboard.

8.1.3 EXCEPTION: Not required during takeoff roll.

8.1.4 ATTENTION IN THE AIR: Execute rapid shallow rocking of wings.

8.1.5 CHANGE LEAD: Make several forward pointing motions, then hold up number of fingers to indicate present position of the pilot who is to assume the lead.

NOTE: IN A FLIGHT OF FOUR AIRCRAFT, THE DEPUTY FLIGHT LEADER -- NORMALLY THE NUMBER 3 MAN (ELEMENT LEADER) -- IS PREBRIEFED.

8.1.6 ECHELON TO RIGHT (OR LEFT): Dip wing right (or left).

8.1.7 FUEL CHECK: Close fist with the thumb extended and perform drinking motion with thumb touching the oxygen mask.

8.1.8 FUEL REMAINING: Extend one finger for each 1000 pounds of fuel on board. Extend finger(s) vertically for 1000-5000 pounds; horizontally for 6000-9000 pounds. After signaling 1000 pound increments, close fist and signal 100 pound increments in the same manner. Signal zero with a closed fist.

8.1.9 GEAR DOWN: Make a downward motion with a closed fist, thumb extended downward.

8.1.10 GEAR UP: Make an upward motion with closed fist, thumb extended upward.

8.1.11 EXCEPTION: During a formation takeoff, preparatory hand signals are not required for raising gear.

8.1.12 JETTISON STORES: Hold fist at top of canopy and make several pumping motions.

8.1.13 LEVEL OFF: Make a horizontal motion with the open hand, palm down.

8.1.14 LOOSEN FORMATION: Fishtail the aircraft.

8.1.15 OXYGEN: Cup hand over oxygen mask; follow by query in the form of an "OK" sign (circle formed by touching ends of thumb and forefinger, other fingers extended).

NOTE: IF THE RESPONSE IS NOT IN THE FORM OF "OK," DESCEND TO LOWER ALTITUDE, OR LAND IMMEDIATELY.

8.1.16 RADIO CHANNEL CHANGE:

8.1.16.1 Preset Channel Change. Tap headset, extend number of fingers equal to channel desired.

8.1.16.2 Manual Frequency Change.

Pre-Briefed Manual Frequency. Tap headset, hold up clenched fist next to helmet.

Manual Frequency Not Pre-Briefed. Tap headset, hold up clenched fist next to helmet and then extend number of fingers for each digit of the frequency of order, pulling hand out of sight between each digit. Extend fingers vertically for digits 1 through 5, and horizontally for digits 6 through 9.

8.1.17 READY FOR TAKEOFF: After runup, the leader looks at the wingman; the wingman nods "yes" or "no," as appropriate.

8.1.18 REFORM OR TIGHTEN FORMATION: Rock wings slowly. (Unless prebriefed otherwise, rejoin to fingertip formation.)

8.1.19 RETARD POWER: Make a backward motion with clenched fist - reverse motion to advance power.

8.1.20 RUNUP ENGINE FOR TAKEOFF: Make a circular motion with vertically extended index finger.

8.1.21 SPEED BRAKE IN OR OUT: Biting motion with hand; fingers and thumb meeting and opening alternately.

8.1.22 START ENGINE: Extend arm over head and make a circular motion with the hand.

8.1.23 START TAKEOFF ROLL: Leader places head back toward headrest and then nods head for brake release.

8.1.24 TRAIL FORMATION: Porpoise the aircraft.

8.1.25 WING FLAPS UP OR DOWN: Hand flat, fingers forward, downward motion of hand from wrist -- to lower flaps; reverse motion -- to raise flaps.

EXCEPTION: DURING FORMATION TAKEOFF, HAND SIGNALS ARE NOT REQUIRED FOR RAISING FLAPS.

8.2 In-Flight Distress Signals - Day Visual

8.2.1 DESCEND TO LOWER ALTITUDE: Hold hand at top of canopy, palm down, fingers extended forward and joined, move hand forward and down.

8.2.2 HEFOE SYSTEM: Clench fist and hold it at top of canopy, then hold up the required number of fingers to denote which system is involved. The receiving pilot acknowledges the signal by repeating it:

Hydraulic - one finger
Electrical - two fingers
Fuel - three fingers
Oxygen - four fingers
Engine - five fingers

8.2.3 I MUST LAND ON YOUR WING: Pat shoulder, palm down; use right hand for left shoulder and vice versa, to prevent confusion with other signals. To acknowledge, other pilot must give an "OK" signal; the basic signal indicates a jet approach speed of 130 knots. If the distressed aircraft desires a higher approach speed, the pilot must raise one finger for each 10-knot increase desired. (FOR F-4 AIRCRAFT: If no other problems are indicated, final approach will be computed and flown to provide "on speed," plus 10 knots, approach for the heaviest aircraft involved). The distressed aircraft lands and the escort executes a go-around.

8.2.4 LAND IMMEDIATELY: Close fist and hold it to top of canopy with thumb extended downward, then move arm up and down rapidly. (Do not confuse this signal with "GEAR DOWN" signal, which is not used at altitude).

8.2.5 RADIO INOPERATIVE (NO ASSIST AIRCRAFT AVAILABLE): Fly parallel to the active runway at 1000 ft AGL, rocking wings until reaching departure end. Turn to downwind and check Tower for green light on base leg and final approach.

8.2.6 RECEIVER FAILURE: With palm of hand over ear position, move hand forward and backward.

8.2.7 TRANSMITTER FAILURE: With palm of hand toward, and in front of face, move hand up and down.

8.2.8 DAY APPROACH END BARRIER ENGAGEMENT: Escorted - extend tailhook. Unescorted - fly parallel to the active runway at 1,000 ft AGL with tailhook down, rocking wings until reaching departure end. Turn to downwind and check Tower for green light on base leg and final approach. Edwards has no approach end barrier. If approach end engagement is required; go to George AFB.

8.2.9 COMPLETE ELECTRICAL FAILURE (NO ASSIST AIRCRAFT AVAILABLE): Fly distressed aircraft 500 ft over Mobile Control or Tower, thoroughly checking for other aircraft in the area. Fly to the far end of the runway, pull up into a downwind leg and proceed with the landing, while watching Mobile or Tower for signals. The Control Tower will clear the area of other aircraft and will call emergency crash equipment to the scene. Consider lakebed!!! If approach end engagement is required, go to George AFB.

8.3 Change of Lead

Should it become necessary to change lead, the flight leader will assign new positions by radio or by hand signal. To prevent confusion as to who is leading, strict procedures are established to change lead within a formation. The following procedures apply when changing positions:

8.3.1 Each flight member will acknowledge understanding of the new position before changes are commenced.

8.3.2 The flight leader will not call for a change in flight positions to be performed at a later time.

8.3.3 Do not change lead while in a turn if flying close or route formation.

8.3.4 Normally, the lead change is initiated and acknowledged by radio in the following manner:

PHANTOM 01: "PHANTOM 2, you have the lead."

PHANTOM 02 will move forward to line abreast and then acknowledge: "PHANTOM 2 has the lead."

PHANTOM 01: "Roger, you have the lead."

NOTE: POTENTIAL FOR MIDAIR IS HIGH DURING LEAD CHANGE. THEREFORE, WHILE CHANGING LEAD, BOTH AIRCRAFT ARE RESPONSIBLE TO AVOID COLLISION AND MUST WATCH ONE ANOTHER CLOSELY. ONCE THE NEW LEADER IS DEFINITELY IN FRONT, HE MAY MOVE EYES BACK TO THE DIRECTION OF TRAVEL.

NOTE: WITH RADIO FAILURE, THE LEAD CHANGES WHEN THE PILOT ABOUT TO ASSUME LEAD ACKNOWLEDGES THE STANDARD VISUAL SIGNAL.

8.3.5 The pilot assuming the lead makes a smooth, but definite, movement away from the formation lead, increasing power to move ahead and stabilizes/holds wings level until the flight has rejoined on him. If he has a wingman, the wingman maintains his position on the new lead and moves with him.

8.4 Close Formation

Close formation is often referred to as fingertip formation because, in flights of four, the positions are aligned in a fingertip fashion:

CAUTION: DISSIMILAR AIRCRAFT (F-4/T-38) FLYING CLOSE FORMATION REQUIRE DIFFERENT REFERENCES TO ENSURE ADEQUATE WINGTIP SPACING.

8.4.1 The basic position is one which aligns the trailing edge wing light with the star on the fuselage and aligns the forward tips of lead's stabilator.

8.4.2 This position will assure the three feet minimum wingtip clearance to avoid wing wash and preclude collision in case you overrun the lead aircraft.

8.4.3 Do not "lock on" one set of reference points -- FLY FORMATION ON ENTIRE AIRCRAFT. Keep this position throughout all maneuvers.

8.4.4 Make power changes in small increments with a smooth throttle motion. Make a correction as soon as you note a position change. The longer you wait to apply a correction, the greater the chance of overcontrolling.

8.4.5 Use the rudder to coordinate turns, and for small in-and-out movements.

8.4.6 Plan to add a small amount of power and back stick pressure when the leader turns away from you, and plan to reduce power slightly and relax back stick pressure on turns into you.

8.4.7 Make small control movements when flying in turbulence. If the aircraft begins to porpoise -- relax, move out, and slow down control movements.

8.4.8 You may alter your position slightly to use the lead aircraft to block out the sun. Being blinded by the sun is more dangerous than being out of position.

Close formation flown well is hard work requiring strict attention, anticipation, and proficiency in throttle and control movements. Mental and physical relaxation are excellent assistance to good formation flying. FLY RELAXED! FLY TRIMMED!

FINGERTIP FORMATION

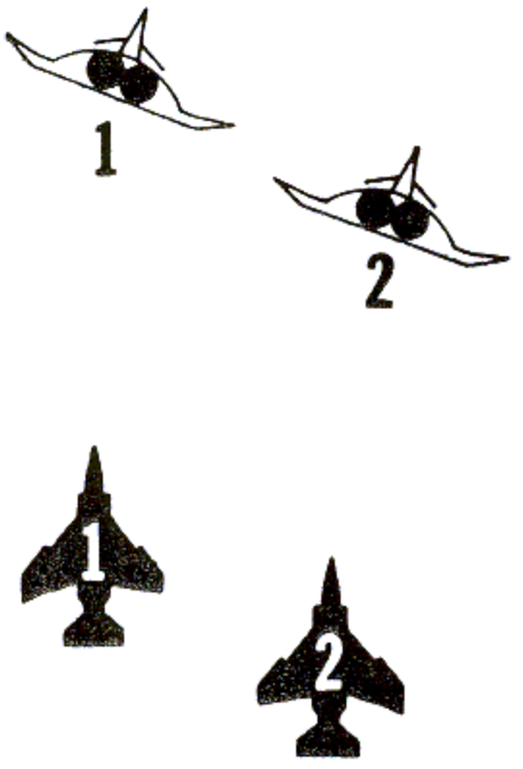

Figure 2

8.5 Route Formation

8.5.1 Aircraft will not crossunder from route unless told by the leader to do so.

8.5.2 Route formation is a modified fingertip formation flown with up to 500 feet clearance between aircraft. The forward wingtip position light on the fuselage star will approximate the desired 10 degrees back of line abreast:

8.5.2.1 When turned into, momentarily reduce power slightly and descend. Stack down, as necessary, to keep lead comfortably in sight, and maintain the same fore/aft position as in straight and level flight. Use back pressure and power to hold the same position during rollout. Power requirements and vertical movement changes are magnified by being further out "on line."

8.5.2.2 When turned away from, roll in place to match the leader's bank and maintain a horizontal position level with the aircraft ahead, adding power as necessary. Hold the position by maneuvering as necessary, and maintaining a higher power setting than the aircraft ahead. Roll out in place, reducing power to maintain position.

8.5.3 Realize that, although route formation is designed to allow you to look around both inside and outside, you must still closely monitor the lead aircraft.

8.6 Crossunder Position Changes

Crossunder position changes are utilized to put the flight in echelon, or in flight repositioning, and will be accomplished as follow:

8.6.1 The signal for execution will be verbal or a dip of the wing toward the direction of echelon.

8.6.2 Reduce power to drop straight back and down to achieve nosetail and vertical separation.

8.6.3 Increase power to stop the backward movement.

8.6.4 Turn slightly to allow a slow and controlled lateral movement toward the other side. Add power slightly again to keep from falling further behind.

8.6.5 Cross under the lead aircraft just below the jet wash, maintaining nose-tail separation.

8.6.6 Continue lateral movement and, when approaching wingtip clearance, turn the aircraft to stop the lateral movement.

8.6.7 Add power to move forward and up to the proper formation position, maintaining wingtip clearance at all times.

8.7 Echelon Formation

Echelon formation is used primarily to break up a flight; i.e., pitchout for landing or tactics. It is efficient for turns away from the flight, but is unwieldy for turns into it. In a two-ship formation, echelon turns will be initiated on a prebriefed signal or radio call:

8.7.1 Realize that in straight and level flight, the same relative position is flown in echelon as in close formation except that all aircraft are on the same side.

8.7.2 On turns away, each pilot will roll in place to align his fuselage with the aircraft ahead on the same horizontal plane.

8.7.3 Maintain a spacing between aircraft which will provide close formation separation on rollout. Maintain proper forward position during turns -- it is easy to fall back.

8.7.4 Anticipate rollouts and maintain wingtip clearance.

8.7.5 Normally, turns will not be made toward the echelon; however, realize that it may be necessary for the flight lead to make gentle turns toward echelon. In this case, fly the position specified for turns in close formation.

8.8 Turning Joinup/Rejoin

A turning joinup requires continuous cross-checks of airspeed and appraisal of position and closure relative to the lead aircraft. It must be accomplished in a timely, precise manner. If not performed correctly, a joinup or rejoin can be hazardous. Aircraft will always join in order. Turning joinups are normally dictated by the mission and prebriefed. Procedures are:

8.8.1 Turning rejoins are signalled by the lead rocking his wings or by verbal command.

8.8.2 Advance the power to attain at least a 50 knots airspeed advantage.

8.8.3 The lead will establish a turn for rejoin. Wingman will turn to obtain a cutoff angle on the inside of the turn. Continue the cutoff angle on the inside of the lead aircraft. One visual cue for the proper "line" is to superimpose lead's vertical stabilizer over his far wingtip. If the wingtip is ahead of the vertical stabilizer, you are ahead of the line, and vice versa. At this point, the joinup is somewhat mechanical, in that bank controls position fore and aft and airspeed governs closure rate.

8.8.4 Position the lead aircraft slightly above the horizon and change bank as necessary to parallel the lead aircraft's fuselage and stay on his wing line.

8.8.5 Maintain about 50 knots airspeed advantage until approximately 2,000 ft from lead (2,000 ft ... can't quite read the small numbers on the tail).

8.8.6 Reduce power and speed as necessary from 2000 ft out to maintain a positive closure up the lead's wing line, still banking as necessary to keep the fuselage parallel.

8.8.7 Continue a close cross-check of airspeed which should gradually descrease to approximately lead's airspeed when a route formation position is attained.

8.8.8 When you are sure the rejoin is controlled, move smoothly to close formation.

8.8.9 Number two aircraft joins on the inside of the turn unless specifically briefed otherwise.

8.8.10 If, approaching the route formation, airspeed and angle off are excessive, reduce bank slightly, descend slightly, and overshoot behind and below the lead aircraft to the outside of the turn. Don't attempt to salvage a questionable rejoin; a controlled overshoot is better than a possible midair situation.

8.8.11 Stabilize in a position level with lead no further forward than line abreast.

8.8.12 Move back to a route position on the inside of the turn and complete the rejoin. If the overshoot was caused by excessive angle off, it may be necessary to move back to the inside of the turn and reposition on the line to complete the rejoin.

8.8.13 Excessive overtake, if recognized early, may be controlled by use of speed brakes and/or power reductions -- otherwise make a controlled overshoot (below and behind).

8.9 Straight Ahead Joinup/Rejoin

8.9.1 Straight ahead joinups are accomplished when weather conditions, terrain, IFR control, or mission expediency dictate. The procedures to accomplish a straight ahead joinup are different and the task is more difficult than a joinup in a turn because closure rate is hard to estimate. The signal of execution for a straight ahead joinup/rejoin is rocking wings or a verbal command.

8.9.2 The Number Two aircraft always joins on left unless briefed otherwise:

8.9.2.1 Increase power to attain sufficient overtake speed to expedite the rejoin, and establish lateral separation.

8.9.2.2 Reduce overtake to 50 knots at approxiamtely 3000 ft in trail.

8.9.2.3 Parallel the formation on the appropriate side, approximately 500 ft out.

8.9.2.4 Gradually reduce the overtake with a power reduction.

8.9.2.5 Continually cross-check the airspeed during closing. Always stay parallel to, and at the proper lateral distance from, the lead aircraft. Avoid a flight path vector directly into lead; rejoin to a point beside him.

8.9.2.6 Speed brakes can be used to slow closure; however, anticipate raising them to avoid falling back.

8.9.2.7 Stabilize on the wing line and then move into close formation.

APPENDIX A

CHECKFLIGHT GRADESHEETS

USAF TEST PILOT SCHOOL
PILOT MISSION CARD/GRADESHEET

MISSION	CLASS	DATE
CF-1		

PILOT	INSTRUCTOR PILOT	AIRCRAFT TYPE/NO	FLIGHT TIME	GRADE
		RF-4C/		

MISSION EVENTS	(SEE REVERSE) PROFICIENCY LEVEL						
	0	INC	1	2	3	4	
1. MISSION PLANNING							
2. PREFLIGHT							
3. START/TAXI/PRE-TAKEOFF							
4. TAKEOFF (MAX)							
5. CLIMB AND LEVEL OFF							
6. LOCAL AREA FAMILIARIZATION							
7. RIG STAB AUG CHECK							
8. STAB AUG INDOCTRINATION							
9. STALLS							
a. CLEAN							
b. ACCELERATED							
c. POWER APPROACH							
10. RAT OPERATION							
11. SINGLE ENGINE OPERATION							
a. SHUTDOWN							
b. BURNER LIGHT (ON SPEED)							
c. AIR START							
12. SPEEDBRAKE OPERATION (SLOW FLIGHT)							
13. INDEXER OPERATION							
14. CONFIDENCE MANEUVERS (OPTIONAL)							
15. PATTERNS AND LANDINGS (SIMULATED EMERGENCY PATTERNS OPTIONAL)							
a. NORMAL							
b. GO-AROUND							
c. CLOSED							
16. NORMAL PROCEDURES							
17. EMERGENCY PROCEDURES (ENGINE RELATED)							
18. JUDGMENT							
19. AIRCRAFT CONTROL							

Comment on the following areas. Expand on any area that is particularly strong or below average/unsatisfactory. Continue on reverse side if necessary.

1. MISSION PREPARATION

2. GENERAL AIRCRAFT HANDLING/FLIGHT SAFETY

3. GENERAL AIRMANSHIP (PLANNING/PROCEDURAL AND AIRCRAFT KNOWLEDGE)

INSTRUCTOR PILOT	SECTION CHIEF	CHIEF, OPERATIONS SQ

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APRIL 1986

USAF TEST PILOT SCHOOL
PILOT MISSION CARD/GRADESHEET

PILOT	INSTRUCTOR PILOT	MISSION	CLASS	DATE
		CF-2		
		AIRCRAFT TYPE/NO	FLIGHT TIME	GRADE
		RF-4C/		

MISSION EVENTS	(SEE REVERSE) PROFICIENCY LEVEL						
	0	INC	1	2	3	4	
1. MISSION PLANNING							
2. PREFLIGHT							
3. START/TAXI/PRE-TAKEOFF							
4. TAKEOFF (MIL IF CLEAN)							
5. CLIMB AND LEVEL OFF							
6. RIG STAB AUG CHECK							
7. SUBSONIC MANEUVERS (0.9M, 30K)							
8. ACCELERATE TO 1.2 M							
a. SUPERSONIC MANEUVERS							
b. STAB AUG EFFECTIVENESS							
c. 4G LEVEL DECELERATION (TRANSONIC TUCK)							
9. MAX RANGE DESCENT (IDLE, 250 KT)							
10. CONFIDENCE MANEUVERS							
a. LOW AOA RECOVERY							
b. LOW AOA AILERON ROLL							
c. LOW AOA HALF-ROLL (INVERTED)							
d. HIGH AOA RUDDER ROLL							
11. HIGH SPEED RUDDER REVERSAL							
12. PATTERNS AND LANDINGS							
a. SINGLE ENGINE PATTERN							
b. NO FLAP							
c. NORMAL							
d. CLOSED							
13. NORMAL PROCEDURES							
14. EMERGENCY PROCEDURES (FLIGHT CONTROL RELATED)							
15. JUDGMENT							
16. AIRCRAFT CONTROL							

Comment on the following areas. Explain any that are particularly outstanding or below average/unsatisfactory. Continue on reverse side if necessary.

1. MISSION PREPARATION

2. GENERAL AIRCRAFT HANDLING/FLIGHT SAFETY

3. GENERAL AIRMANSHIP (PLANNING/PROCEDURAL AND AIRCRAFT KNOWLEDGE)

INSTRUCTOR PILOT	SECTION CHIEF	CHIEF OPERATIONS DO

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USAF TEST PILOT SCHOOL PILOT MISSION CARD/GRADESHEET		MISSION CF-3	CLASS	DATE
PILOT	INSTRUCTOR PILOT	AIRCRAFT TYPE/NO RF-4C/	FLIGHT TIME	GRADE

MISSION EVENTS	(SEE REVERSE) PROFICIENCY LEVEL						
	D	INC	1	2	3	4	
1. MISSION PLANNING							
2. PREFLIGHT							
3. START/TAXI/PRE-TAKEOFF							
4. TAKEOFF (MAX)							
5. CLIMB AND LEVEL OFF							
6. RIG STAB AUG CHECK							
7. CONFIDENCE MANEUVERS							
a. LOW AOA RECOVERY							
b. LOW AOA AILERON ROLL							
c. LOW AOA HALF-ROLL (INVERTED)							
d. HIGH AOA RUDDER ROLL							
8. HIGH SPEED RUDDER REVERSAL							
9. STALLS							
a. CLEAN							
b. ACCELERATED							
c. POWER APPROACH							
10. AEROBATICS							
a. LOOP							
b. SPLIT "S" AND DIVE RECOVERY							
c. IMMELMANN							
d. CLOVERLEAF							
11. REVIEW CF-1 AND CF-2 MANEUVERS (AS REQUIRED)							
12. PATTERNS AND LANDINGS							
a. SINGLE ENGINE							
b. SINGLE ENGINE GO-AROUND							
c. NO FLAP							
d. NORMAL							
13. NORMAL PROCEDURES							
14. EMERGENCY PROCEDURES (HYDRAULIC FAILURE RELATED)							
15. JUDGMENT							
16. AIRCRAFT CONTROL							

Comment on the following areas. Expand on any item that is particularly above or below average/unsatisfactory. Continue on reverse side if necessary.

1. MISSION PREPARATION

2. GENERAL AIRCRAFT HANDLING/FLIGHT SAFETY

3. GENERAL AIRMANSHIP (PLANNING/PROCEDURAL AND AIRCRAFT KNOWLEDGE)

INSTRUCTOR PILOT	SECTION CHIEF	CHIEF, OPERATIONS BR

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USAF TEST PILOT SCHOOL
PILOT MISSION CARD/GRADESHEET

MISSION	CLASS	DATE
CF-4		

PILOT	INSTRUCTOR PILOT	AIRCRAFT TYPE/NO	FLIGHT TIME	GRADE
		RF-4C/		

MISSION EVENTS	(SEE REVERSE) PROFICIENCY LEVEL						
	0	NC	1	2	3	4	
1. MISSION PLANNING							
2. PREFLIGHT							
3. START/TAXI/PRE-TAKEOFF							
4. TAKEOFF (MAX)							
5. CLIMB (MIL PWR) & LEVEL OFF							
6. RIG STAB AUG CHECK							
*7. TRIM SHOT							
a. FRONT SIDE							
b. BACK SIDE							
*8. CONFIDENCE MANEUVERS							
a. LOW AOA RECOVERY							
b. LOW AOA AILERON ROLL							
c. LOW AOA HALF-ROLL (INVERTED)							
d. HIGH AOA RUDDER ROLL							
9. HIGH SPPED RUDDER REVERSAL							
10. STALLS							
a. CLEAN							
b. ACCELERATED							
c. POWER APPRAOCH							
11. AEROBATICS							
12. MAX RANGE DESCENT (IDLE, 250 KT)							
*13. TOWER FLYBY							
14. PATTERNS AND LANDINGS							
a. SINGLE ENGINE							
b. SINGLE ENGINE GO-AROUND							
c. NO FLAP							
d. NORMAL							
15. NORMAL PROCEDURES							
16. EMERGENCY PROCEDURES (ELECTRICAL FAILURE RELATED)							
17. JUDGMENT							
18. AIRCRAFT CONTROL							
* - OPTIONAL							

Comment on the following areas. Expand on any area that is particularly strong or below average/unsatisfactory. Continue on reverse side if necessary.

1. MISSION PREPARATION

2. GENERAL AIRCRAFT HANDLING/FLIGHT SAFETY

3. GENERAL AIRMANSHIP (PLANNING/PROCEDURAL AND AIRCRAFT KNOWLEDGE)

INSTRUCTOR PILOT	SECTION CHIEF	CHIEF, OPERATIONS BR

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USAF TEST PILOT SCHOOL
PILOT MISSION CARD/GRADESHEET

MISSION	CLASS	DATE
CF-5		

PILOT	INSTRUCTOR PILOT	AIRCRAFT TYPE/NO	FLIGHT TIME	GRADE
		RF-4C/		

MISSION EVENTS	(SEE REVERSE) PROFICIENCY LEVEL						
	0	INC	1	2	3	4	
1. MISSION PLANNING							
2. PREFLIGHT							
3. START/TAXI/PRE-TAKEOFF							
4. TAKEOFF (MAX)							
5. CLIMB (MIL POWER)							
6. RIG STAB AUG CHECK							
*7. TRIM SHOT (FRONT AND BACKSIDE)							
8. CONFIDENCE MANEUVERS							
a. LOW AOA RECOVERY							
b. LOW AOA AILERON ROLL							
c. LOW AOA HALF-ROLL (INVERTED)							
d. HIGH AOA RUDDER ROLL							
9. HIGH SPEED RUDDER REVERSAL							
10. STALLS							
a. CLEAN							
b. ACCELERATED							
c. POWER APPROACH							
11. AEROBATICS							
a. LOOP							
b. CLOVER LEAF							
12. PATTERNS AND LANDINGS							
a. SINGLE ENGINE							
b. SINGLE ENGINE GO-AROUND							
c. NO FLAP							
d. NORMAL							
*e. CLOSED							
13. NORMAL PROCEDURES							
14. EMERGENCY PROCEDURES							
15. JUDGMENT							
16. AIRCRAFT CONTROL							
17. KNOWLEDGE OF LOCAL AREA							
* - OPTIONAL							

Comment on the following areas. Explain on the item that is particularly satisfactory or below average/unsatisfactory. Continue on reverse side if necessary.

1. MISSION PREPARATION

2. GENERAL AIRCRAFT HANDLING/FLIGHT SAFETY

3. GENERAL AIRMANSHIP (PLANNING/PROCEDURAL AND AIRCRAFT KNOWLEDGE)

CLEARED DAY/VFR SOLO? YES _____ NO _____

INSTRUCTOR PILOT	SECTION CHIEF	CHIEF, OPERATIONS BR

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APPENDIX B

F-4 CHECKLIST GOUGE

Many people new to the F-4 are intimidated by its complexity and, in particular, the myriad of checks required to just start engines and taxi. These notes will hopefully clear some of the muddy waters and ensure that minimal time is spent getting to the runway. Other significant checks are also included. Note that this listing skips all checklist steps for equipment deleted from our aircraft. This is not the "gospel" on checklist procedures. It is, however, one instructor's technique. It is also one approved solution.

Starting Engines

At the very end of your Front Cockpit (FCP) interior check, establish intercom communication with your the Rear Cockpit (RCP) and the CHIEF (maintenance crew chief on headset). CNI power should be on so you can monitor ground control during engine start. NOTE: The following words in all capital letters are verbalized over the intercom by the indicated position.

FCP	RCP
CHECK MASTER CAUTION LIGHT	ON
Reset Master Caution Light	OUT
OXYGEN QUANTITY COMING DOWN - while depressing oxygen test button	MASTER CAUTION - at 1 liter
EJECT LIGHT - press on/off	ON/OFF
MY SEAT PINS ARE OUT AND STOWED	MY PINS ARE OUT AND STOWED

FCP	CHIEF
FORE & AFT AREA CLEAR (visually confirm)	CLEAR
FIRE GUARD POSTED (visually confirm)	FIRE GUARD ON THE RIGHT/LEFT
THROTTLES - OFF (check)	
MASTER SWITCHES - ON	
AIR ON #2	AIR ON #2
ROTATION (when RPM noted)	ROTATION (RCP)
At 10%, press and hold ignition button while advancing throttle (#2) to about mid range and then back to idle stop.	
LIGHT OFF - release ignition button	
Confirm oil and hydraulic indications	

FCP	CHIEF
At 45% - AIR OFF	AIR OFF
Check idle engine indications	
AUX AIR DOORS & SPEED BRAKES - CLEAR	CLEAR
Cycle right generator - on	
SPOILER CHECK	FLIGHT CONTROLS CLEAR
Move stick one inch to the left/then back to center.	LEFT SPOILER UP/BACKDOWN
AIR ON #1	AIR ON
ENGINE START SAME AS #2	
AUX AIR DOORS & SPEED BRAKES CLEAR - Cycle Left generator on; then cycle right generator off/on checking for appropriate indications.	CLEAR
DISCONNECT ALL POWER & AIR	DISCONNECTED
WE'RE ON INTERNAL POWER - CLEARED TO ALIGN	ROGER (RCP)
Check your g-suit operation and turn your TACAN to T/R and your IFF to STBY	
SPEED BRAKES - CLEAR	CLEAR
Cycle down	SPEED BRAKES DOWN - NO LEAKS- CLEARED UP
Cycle up	SPEED BRAKES - UP
FLAPS	FLAPS CLEARED DOWN
Cycle down	FLAPS DOWN - BLC CHECKS GOOD - FLIGHT CONTROLS CLEAR
Move stick full aft	STAB LEADING EDGE FULL DOWN
Release Stick and it should move closer to full forward stop - one pound push may be required to push to stop.	STAB LEADING EDGE FULL UP
Move rudder pedal full left/right	RUDDER FULL LEFT/RIGHT
Move stick full left	RIGHT AILERON DOWN, LEFT AILERON AND SPOILER UP, RUDDER SLIGHTLY LEFT...

FCP	CHIEF
Engage yaw stab aug	RUDDER KICK
Depress paddle switch	RUDDER CENTERING .. NEUTRAL
Disengage yaw stab aug, release paddle switch and move stick full right.	LEFT AILERON DOWN, RIGHT AILERON AND SPOILER UP, RUDDER SLIGHTLY RIGHT...
Engage yaw stab aug	KICKED
Depress paddle switch	RUDDER CENTERING...NEUTRAL - FLAPS CLEARED UP
Center stick, release paddle switch, disengage yaw stab aug and raise flaps	FLAPS UP - CHECKING BLC - BLC IS OFF - FLIGHT CONTROLS CLEAR
Cycle stick left and right several times	NO RUDDER MOVEMENT
WATCH THE RUDDER - NOW (as you engage Yaw stab aug)	NO MOVEMENT
AILERON - NOW (as you engage the roll aug)	NO MOVEMENT
Disengage roll aug	
OTHER SIDE - NOW (as you engage the roll aug)	NO MOVEMENT
STAB - NOW (as you engage the pitch aug)	NO MOVEMENT
Disengage all stab augs and reset the Master Caution Light	
HOW'S THE TRIM LOOK	TRIM GOOD
Check pneumatic pressure within limits	
Check IFF NORMAL MODE 3 BIT and a green light then back STBY	
ALTIMETER CHECK SET XX.XX - Compare readings within 75 ft of field elevation and 75 ft of other cockpit.	
ENGAGING SPC - NOW-engage SPC and note jump not more than 25 ft in RF-4C, within 90 ft of field elevation and 100 ft of other cockpit.	
RESET - jump no more than 75 ft, within 75 ft of field elevation and 75 ft of other cockpit.	

FCP	RCP
	CLEARED PRIMARY (after selecting NAV in RCP)
Switch reference system to Primary and compare headings - if necessary wait 10 seconds and use SYNC to align headings	
CHIEF - YOU'RE CLEARED OFF	

Now for a few other checks. The RCP (GIB) normally reads the checklist throughout the rest of the mission (after prompting from the FCP).

TAXIING

RCP	FCP
BRAKES AND NOSE GEAR STEERING - just before moving out of the chocks	BRAKES - GOOD, NOSE GEAR STEERING - GOOD LEFT AND RIGHT
FLIGHT INSTRUMENTS - once clear of the parking area.	During turns left/right - NEEDLE LEFT/ RIGHT, BALL RIGHT/LEFT, 3 DECREASING/INCREASING NUMBERS (Heading)
OXYGEN - ON/NORMAL/NORMAL XX PSI, X LITERS AND GOOD BLINKER	OXYGEN - ON/NORMAL/NORMAL XX PSI, X LITERS AND GOOD BLINKER

BEFORE TAKEOFF

HARNESS & LEADS	I'M FASTENED & SECURED, PINS ARE OUT AND STOWED, G-SUIT CHECKED
I'M FASTENED AND SECURED, PINS ARE OUT AND STOWED, G-SUIT CHECKED	
INTERNAL WING TRANSFER	NORMAL
TANK 5/6 LOCKOUT	NORMAL
STAB AUGS	ENGAGED
FLIGHT CONTROLS - MY KNEES ARE CLEAR	
Visually confirm control surface movement - LEFT SIDE UP/RT SIDE DOWN ETC.	Cycle flight controls around the horn left/right
ANTI-ICE	NORMAL
STABILATOR TRIM	DOWN 3 (normally 2-3 down)
FUEL QUANTITY	X.X OVER XX.X (E.G. 7.2 OVER 11.4)
CANOPIES - (RCP first)	

RCP	FCP
CANOPY DOWN AND LOCKED, LIGHT'S OUT AND STRIPES ALIGNED	
	CANOPY DOWN AND LOCKED, LIGHTS OUT, STRIPES ALIGNED
WARNING LIGHTS/VOICE WARNING for CANOPY-CANOPY, ALTITUDE- ALTITUDE voice warning; Also check all lights on telelight panel.	Actuate warning test switch and listen
DEFOG/FOOTHEAT & TEMP CONTROLS	SET
COMMAND SELECTOR VALVE - (as briefed)	
MY LOWER GUARD IS CLEAR	MY LOWER GUARD IS CLEAR

LINEUP

EXTERNAL TRANSFER	OUTBOARD (if tanks loaded)
FLAPS	COMING DOWN...DOWN
ANTI-SKID LIGHTS OUT	Once in lineup position, release brakes, turn switch ON and depress brakes - ON,
COMPASS HEADING	xxx - COMPARE TO KNOWN RUNWAY HEADING
PITOT HEAT	ON
IFF	NORMAL
CIRCUIT BREAKERS ... CHECKED IN	CHECKED IN
WARNING LIGHTS	Check telelight panel for any lights

AFTER TAKEOFF

GEAR UP - when noted

FLAPS UP - when noted

CRUISE

RCP	FCP
ALTIMETER	Set appropriately, check difference between STBY/RESET and cockpits
RADAR ALTIMETER	If you have one, as you desire
SURVIVAL KIT SELECTOR SWITCH - AUTO	AUTO
OXYGEN QUANTITY/PRESSURE/BLINKER - CHECK AND BLINKER	ON/NORMAL/NORMAL-GOOD PRESSURE QUANTITY
COCKPIT PRESSURE	Read and confirm correct
FUEL QUANTITY	X.X OVER X.X
STANDBY COMPASS	Compare
CIRCUIT BREAKERS	Check
ANTI-ICE	NORMAL

DESCENT

DEFOG/FOOTHEAT & TEMP CONTROLS	SET
STAB AUGS	ENGAGED
COMM ANTENNA	UPPER
LANDING/TAXI LIGHT	LANDING (Forward position on RF-4C)
ALTIMETERS - SET XX.XX	SET XX.XX
FUEL QUANTITY	X.X OVER X.X

LANDING

FCP

GEAR - DOWN

FLAPS - DOWN

HYDRAULIC PRESSURES - GOOD

(NO) WARNING LIGHTS (Check telelight panel)

ANTI-SKID-ON, LIGHT OUT

AFTER LANDING

RCP	FCP
ANTI-SKID (Below 30 kts)	OFF
COMMANDER SELECTOR VALVE - VERTICAL	
COCKPIT PRESSURE	DUMPED - pull emergency vent knob
MY LOWER GUARD'S UP	MY LOWER GUARD'S UP
FLAPS	UP
DRAG CHUTE	Jettison along taxiway
STAB AUGS	OFF
INTERNAL WING DUMP	NORMAL
VOR/ILS	OFF
ENGINE ANTI-ICE	NORMAL
STAB TRIM	DOWN 3
REFERENCE SYSTEM	STBY
RAIN REMOVAL, PITOT HEAR & IFF	OFF/OFF/OFF
TEMPERATURE, DEFOG/FOOTHEAR/CONTROLS emergency vent knob to blow out moisture in system.	FULL UP - Once canopy is open, reset
TACAN - OFF	OFF
FORMATION LIGHTS	OFF

SINGLE ENGINE TAXI

RIGHT GENERATOR	OFF
BUS TIE	CLOSED
UTILITY PRESSURE	GOOD
RIGHT ENGINE	OFF

ENGINE SHUTDOWN

RADIO - OFF

EJECTION SEAT - FULL UP

DEFOG/FOOTHEAT AND TEMP CONTROLS - NORMAL SETTING

INS AND NAV COMPUTER - OFF

SPOILER CHECK - Move stick 1 inch right on crew chief's signal then center

LEFT THROTTLE - OFF

MASTER SWITCHES - OFF

BEFORE LEAVING COCKPIT

FACE CURTAIN SAFETY PIN - INSTALLED

OXYGEN DILUTER LEVEL - 100%