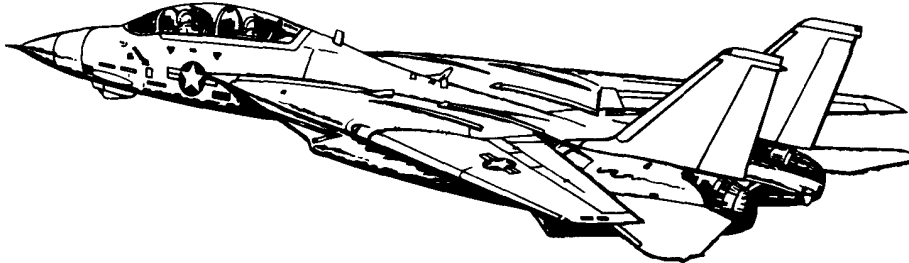




NATOPS FLIGHT MANUAL NAVY MODEL F-14D AIRCRAFT

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CHAPTER 8

Carrier-Based Procedures

8.1 CARRIER PREFLIGHT

8.1.1 Launch

Applicable aircraft launching bulletins, the CV and LSO NATOPS Manuals and the pertinent CV air operations manual shall be read by all flight crewmembers prior to carrier qualification. In addition, the predeployment lecture syllabus contained in Chapter 1 of the CV NATOPS Manual shall be completed.

8.1.2 Briefing

A thorough briefing shall be accomplished by the flight leader prior to launch. This briefing should call particular attention to current BINGO fields, emergency procedures peculiar to carrier operations, operating area NOTAMs, fuel management, and ship NAVAID status. Aircraft configuration, gross weight, expected WOD, and applicable launch trim settings will be verified prior to man-up.

8.1.3 Preflight

Preflight inspection should be accomplished with particular attention given to nose strut, main landing gear tires, hook, and underside of the fuselage. Note carefully the actual wing sweep, the lateral spacing between parked aircraft, and the general direction of engine exhaust. Do not preflight the aircraft topside aft of the bleed air doors if spotted with the tail outboard of the safety nets. In the cockpit, particular attention should be given to the flightcrew displays to ensure that they are properly secured and that the retaining devices have been installed. Ensure that the WING SWEEP handle is secure in the oversweep position when applicable. If the wings are not in oversweep, ensure that the emergency WING SWEEP handle position corresponds with the actual wing position. Leave the emergency WING SWEEP handle guard up, extend the emergency WING SWEEP handle, and pull WING SWEEP DRIVE NO. 1 and WG SW DR NO. 2/ MANUV FLAP circuit breakers (LD1, LE1). Crossbleed starts should not be performed unless the area aft of the aircraft is clear. Tiedowns should not be removed and engines should not be started unless the auxiliary brake air pressure gauge indicates a full charge.

8.2 START AND POSTSTART

Shipboard start and poststart procedure abbreviations of the shore-based checklists are as delineated for the poststart-pilot procedures. Certain steps are omitted because aircraft are spotted too close together to allow the wings to be swept forward while tied down. Cranking the left engine prior to starting the right, as outlined in the shore-based procedures, will ensure that auxiliary brake pressure is available and will ensure that backup flight control module is full of hydraulic fluid prior to cycling.

8.2.1 Carrier Alignment

Carrier alignment of the INS and SAHRS concurrently or of the INS alone can be accomplished using SINS data or manually entered ship's position, speed, and heading. A stored heading SINS alignment is also available.

8.2.1.1 Concurrent SINS Alignment

For either data-link or deck-edge-cable transmission of SINS data:

1. DATA LINK power switch — ON.
2. DATA LINK MODE switch — CAINS/WPT.
3. Verify parking brake is set.

Note

Application of SAHRS power prior to selecting CV ALIGN will not allow SAHRS to properly align.

4. NAV MODE switch — CV ALIGN.
5. Select OWN A/C MFD format by depressing DATA pushbutton on MFD MENU1 display. The CV SINS DATA format will appear.
6. Verify that SHDG is not boxed. If it is, depress the SHDG pushbutton to unbox it.
7. Monitor the progress of alignment by observing the QUAL and TIME acronyms and the align scale on the MFD OWN A/C format. The SINS (ship) latitude, longitude, and INS north and east velocities can be evaluated on the MFD OWN A/C format. An INS ALIGN COMPLETE message will normally occur in 7 minutes. At this time the align quality should be below 1 nm per hour.

Note

Do not select SAHRS during CV ALIGN to check alignment progress. Wait until INS alignment is complete and INS has been selected on the NAV MODE switch before selecting SAHRS.

8. SAHRS alignment progress may be monitored at this time by selecting the NAV page.

Note

- The SAHRS alignment process will initiate after the INS determines a valid true heading (approximately at INS quality value of 5). SAHRS quality value should reinitiate to approximately 31.2 at that time.
 - If power has been applied to the aircraft for an extended period of time prior to INS CV align being initiated, the SAHRS may complete a ground align (NORM) and a SAHRS complete message appears on the MFD. After the INS CV align is initiated, the SAHRS will initiate a concurrent CV align normally, but another SAHRS align complete message may not appear.
9. It is advisable to continue alignment after appearance of the INS ALIGN COMPLETE message if time permits. When ready to take the alignment, the inertial navigation mode may be selected by setting the NAV MODE switch to INS, waiting for 5 seconds, then setting it to IFA. The RIO may take the alignment anytime the QUAL reaches 1.0 nm per hour. The NAV Mode switch should be rotated to the INS position for a few seconds then rotated to the IFA position. This places the navigation system in the INS/GPS mode of operation.

Note

Although SINS alignment normally requires no entry of data, if a SINS alignment takes place at any carrier location other than the flight deck, then it is advisable to enter the correct vertical lever arm via the DEU. This is the height in feet of the aircraft INS above the carrier SINS location. This entry can be made only via the DEU by calling up the DEU CV ALIGN page and depressing the VLA option key.

8.2.1.2 Concurrent SINS Stored Heading Carrier Alignment

Perform a reference alignment by following the SINS carrier align procedure in paragraph 8.2.1.1. When the INS ALIGN COMPLETE message appears on the HUD/VDI formats, return the NAV MODE switch to OFF.

1. Repeat steps 1 through 7 of concurrent SINS alignment.
2. Verify that SHDG is boxed on CV SINS DATA MFD format.
3. Repeat steps 9 and 10 of concurrent SINS alignment.

8.2.1.3 Concurrent Manual Carrier Alignment

The INS and SAHRS will initiate ground alignments if there is no SINS data. The CV MANUAL format will be displayed after the ship's data is entered.

1. Repeat steps 1 through 8 of concurrent SINS carrier align.

Note

If the SINS or data link is not operating or if a manual carrier alignment is desired, skip steps 2 and 3.

2. Enter best knowledge of ship's latitude, longitude, speed, and heading via the DEU or DD. When the DATA pushbutton on the MFD is depressed, the CV MANUAL DATA format appears.

Note

- If SINS is restored, MAN must be unboxed on the CV DATA format in order to return to a CV RF alignment.
 - Entry of VLA is never required for manual carrier alignment.
 - When using the DEU, data entry is made via the DEU CV ALIGN format, using the LAT, LONG, CSPD and CHDG pushtiles, and the appropriate quadrant and numerals.
 - Data entry using the DD requires selection of the NAV category from the MFK pushtile and the boxing of the OWN A/C acronym prior to entering the carrier latitude and longitude via the DD LAT, LONG, quadrant and numeral pushtiles. Entry of carrier speed and heading via the DD requires the boxing of the WIND acronym prior to using the DD SPD, HDG and numeric pushtiles.
3. Repeat steps 9 through 11 for concurrent SINS carrier align.

Note

In concurrent manual carrier align, the INS ALIGN COMPLETE computer message may take 15 minutes or longer to appear. The navigation quality at this time may not be better than 3 nm per hour. Because of the extensive align-

ment time, it may be necessary to launch prior to the receipt of the INS ALIGN COMPLETE computer message.

8.2.2 SAHRS Standalone Carrier Alignment

The SAHRS standalone CV alignment mode is manually selected via the SAHRS ALIGN MFD format by depressing the SAHR and then CV pushbutton. There are two SAHRS standalone align modes. Which mode obtained depends on when CV is selected. If CV is selected prior to the INS determining true heading (approximately INS quality of 5) and initiating the SAHRS CV concurrent align, a SAHRS standalone align is commanded when the SAHRS has no heading information.

Note

Currently there is no indication on the MFD displays that the SAHRS has gone into the standalone mode except the SAHRS quality value will remain 10.0, the timer will be 00, SAHRS concurrent CV align will not initiate, and there will be no attitude information available from the SAHRS for up to 6 minutes or more. Reinitiating the INS alignment will allow a concurrent alignment to occur.

The SAHRS has no true standalone carrier align mode like the INS. During concurrent INS/SAHRS carrier align modes, the SAHRS depends on the INS to provide an initial input of true heading. Since this is not available in SAHRS standalone carrier alignment, when the SAHRS CV pushbutton is depressed in SAHRS standalone operation, it is commanded to a DG mode. Once the parking brake is released a DG heading can be entered via the DEU. When the aircraft is airborne, the slaved mode can be selected or if a system velocity source is present, in-flight restart can be selected to bring the SAHRS to a normal operational mode.

If CV is selected after the INS has initiated the SAHRS CV concurrent alignment, the SAHRS alignment proceeds but is no longer receiving updated position and velocity information from the INS. The alignment will be considerably slower than concurrent alignment. The SAHRS is commanded to NORM mode. An in-flight restart may or may not be required depending on the SAHRS alignment quality.

SAHRS cannot be commanded to a CV mode unless the INS is in CV. If the INS is unavailable, the SAHRS will attempt a normal ground align.

8.2.3 GPS On-Deck IFA Alignment

This method of alignment will take about 5 minutes longer than a normal carrier (CV) alignment, but only requires you to place the NAV MODE switch in IFA and leave it there. Another advantage of GPS IFA Alignment is that you can taxi while aligning in this mode, but the satellites must be acquired before alignment begins.

Note

INS alignment to GPS data via the INS/GPS mode is not always optimum from a cold start. It may require up to 10 minutes (plus up to 2 minutes for MAGR initialization), compared to only 5 minutes for a normal carrier (CV) alignment. If movement of the aircraft during alignment is not anticipated, a normal concurrent CV alignment followed by placing the NAV MODE switch to INS momentarily, then selecting IFA (In-Flight Alignment) may be more expeditious and will yield the same system accuracy.

Global Positioning System satellite acquisition normally takes from 90 seconds to 3 minutes, depending on location and LOS (line-of-sight) blockage by other aircraft and carrier island, etc.

To get an IFA Alignment on deck, perform the following steps:

1. Place the NAV MODE switch in IFA at application of aircraft power.
2. Verify OWN A/C position is correct. Verify correct date and time on the GPS Status page. If satellites have been acquired, the OWN A/C data page will show own aircraft position based on GPS, if GPS is boxed.

Note

If GPS data is lost during alignment, the navigation system will go to align hold.

3. Monitor the GPS Status page to ensure satellites are acquired within a few minutes of placing the NAV MODE switch out of the OFF position to IFA. IFA alignment will not commence until satellites are acquired. If satellites are not acquired after a few minutes, transition to a normal CV alignment (on NAV Mode Switch select OFF then CV).
4. The alignment will progress on its own. When the QUAL gets to 1.0, the system will automatically take the alignment and display the INS ALGN CMPLT message. You can taxi and even take off without disrupting the align process.

Note

The pilot will not have an FPM (Flight Path Marker) until the alignment is complete.

5. If the system loses GPS quality at any time during flight or while on the CV deck due to satellite drop outs or antenna blanking, the system will continue in INS mode until FOM is ≤ 4 and will use GPS data.

Note

The NAV MODE switch must remain in the IFA position to remain in the primary navigation

mode, INS/GPS. This mode can also be obtained by conducting a normal CV alignment, followed by moving the NAV MODE switch from CV to INS to IFA. GPS FOM ≤ 4 to be effective.

8.3 TAXIING

Shipboard taxi operations differ slightly from the field. Taxiing aboard ship requires higher power settings and must be conducted under positive control of a plane director. Any signal from the plane director above the waist is intended for the pilot and any signal below the waist is intended for deck-handling personnel.

8.3.1 Nosewheel Steering

The nosewheel steering system characteristics are excellent and enable extremely tight cornering capability. At full nosewheel steering deflection (70°), the inside main-mount wheel backs down and turn radius will be restricted if the inside brake is locked. For a minimum radius turn, momentarily depress the brake on the inside wheel and then allow the inside wheel to roll freely while controlling the turn rate by braking the outside wheel. For normal turns, symmetric brake applications should be applied to control aircraft forward motion. Forward motion should be initiated before effecting a tight radius turn to reduce power requirements.

8.3.2 Taxi Speed

Taxi speed should be kept under control at all times, especially on wet decks and approaching the catapult area. Be prepared to use the parking brake should normal braking fail. While taxiing, both ejection seats should be armed. The parking brake is an excellent feature that may be used to prevent leg fatigue during taxi delays. However, it should not be used once forward of the jet-blast deflector.

8.3.3 Final Checker Aboard CV

1. Hook — Down On Director Signal; Check RATS Advisory Light On, Then Up.



Carrier operations with an inoperative RATS will increase CV wind-over-deck requirements. Failure to notify CV OPS may result in damage to the ship's arresting gear and aircraft tailhook assembly structure. Consult applicable recovery bulletins.

2. Nosewheel steering — Cycle OFF, Then ON.



Failure to cycle nosewheel steering following hook check will enable nosewheel steering cen-

tering to remain engaged and can cause mispositioning of the launch bar during catapult hookup. This may result in launch bar disengaging from shuttle during catapult stroke.

8.4 CATAPULT HOOKUP (DAY)

Set the attitude displays to show level flight at normal strut extension. Proper positioning on the catapult is easily accomplished if the entry is made with only enough power to maintain forward motion and if the plane director signals are followed explicitly.

WARNING

- All functional checks shall be performed before taxiing onto the catapult. Ensure that the Takeoff Checklist is complete and that the proper trim is set for launch before entering the nosetow approach ramp.
- All catapult launches shall be conducted with the HUD in the caged mode. If approaching the catapult after an uncaged HUD landing, cycle the TLN display mode button to ensure the HUD defaults to the caged format.

The catapult director will direct the pilot to approach the catapult track, using nosegear steering and brakes. Upon signal from the plane director and when positioned immediately behind the mount of the lead-in track, kneel the aircraft. If the launch bar is to be lowered from the cockpit, upon signal from the plane director, deflect the nosewheel to lower the launch bar, center the nosewheel, and disengage nosewheel steering. If the launch bar is to be lowered by the deck crew, no pilot action is required. After the hold-back bar has been attached to the aircraft and checked by squadron maintenance personnel, the catapult director will direct the aircraft forward until the holdback bar is snug against the catapult buffer unit. The aircraft will be stopped in position for shuttle tension up. The attitude displays will show 2° to 3° nosedown with the aircraft in the kneeled position.

WARNING

Nosewheel centering can contribute to launch bar misalignment in the catapult shuttle, which could result in premature launch bar separation during launch. The nosewheel centering latching relay must be deactivated by depressing the nosewheel steering button after the hook check and before entering the catapult. It will also deactivate the nosewheel steering automatic disengagement function; nosewheel steering must be manually disengaged when entering the catapult.



- If the LAUNCH BAR light illuminates immediately upon selecting KNEEL with the NOSE STRUT switch, a malfunction in the system has occurred and the landing gear will not retract following the catapult launch.
- Nosewheel steering is designed to disengage and the NWS ENGA light goes off when deck personnel lower the launch bar on the catapult. The arresting hook must have been cycled on deck and the throttles set at IDLE to enable the system. This feature prevents the pilot from inadvertently damaging the launch bar during control checks after final tensioning.

8.4.1 Catapult Trim Requirements

The following requirements are applicable to clean aircraft or any combination of air-to-air store, external tank, gross weight combinations, and launch cg locations between 7.0-percent and 18.5-percent MAC.

Note

To determine center of gravity for a particular aircraft, refer to NAVAIR 01-1B-4, Handbook of Weight and Balance.

Figure 8-1 lists recommended catapult launch longitudinal trim settings.

Anticipated End Airspeed Above Minimum (Knots)	Longitudinal Trim (degrees) Trailing Edge Up		
	Cg between 7.0% and 11% MAC	Cg between 11% and 16% MAC	Cg between 16% and 18.5% MAC
0 to 9	9	6	3
10 to 20	8	5	2
21 to 50	7	4	0

Figure 8-1. Catapult Launch Trim Requirements

8.4.2 Catapult Launch

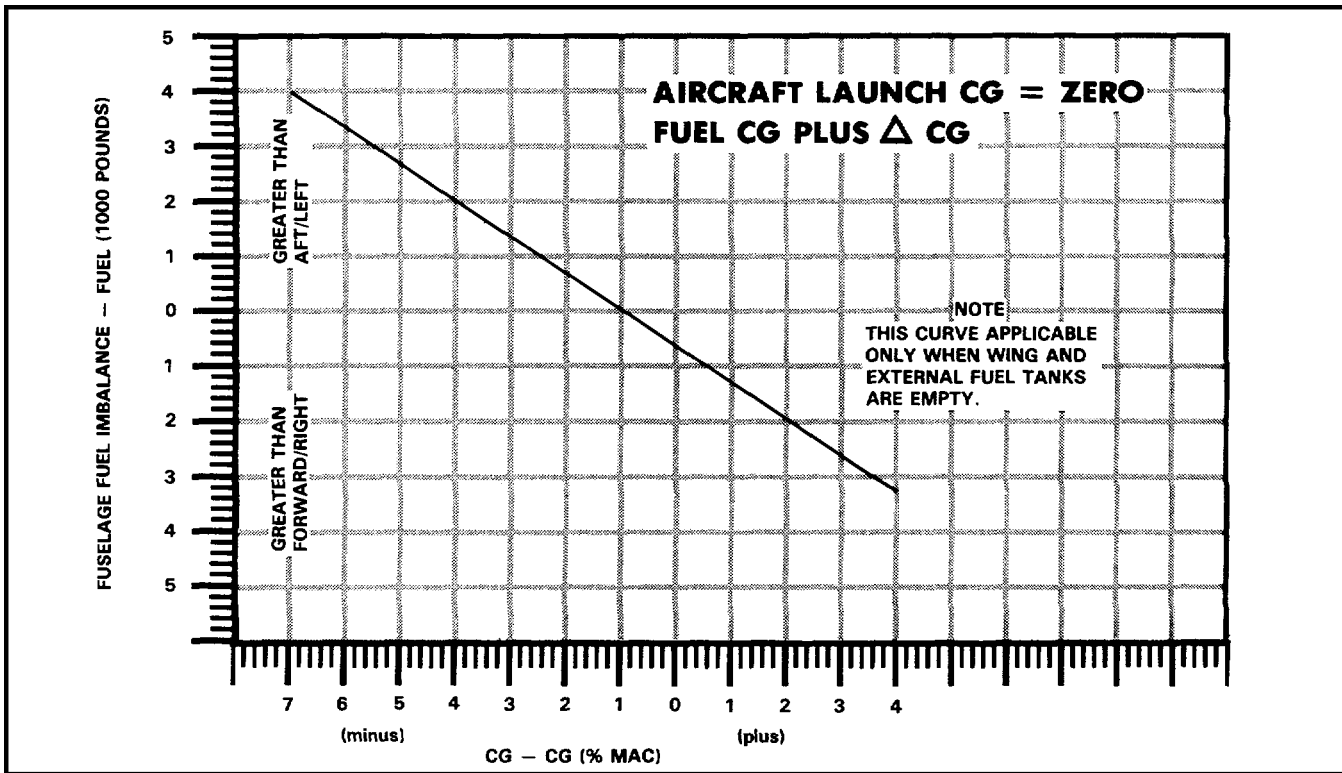
Aircraft launch gross weight will be cross-checked and verified by signal with the flight deck personnel prior to kneel. If the aircraft is to be catapulted with a partial fuel load, the pilot should ensure that longitudinal trim settings are adjusted if necessary (Figure 8-1). Upon receipt of the “tension-up and release brakes” signal, release the brakes, ensure the parking brake is off, and advance the throttles to MIL. Ensure nosewheel steering is disengaged prior to performing control wipeout. When a turnup signal is received from the catapult officer, grip the throttles firmly, check engine instruments, ensure that the caution and advisory panel is clear, and the RIO is ready. When satisfied that the aircraft is functioning properly, salute the catapult officer. Normally, a 3 to 5-second delay will occur before the catapult fires. Optimum launch technique is to maintain a loose grip on the control stick while allowing it to move aft during the catapult stroke.

WARNING

- Failure to allow the control stick to move aft during the catapult stroke will result in degraded pitch rate and excessive sink rate off the bow.
- Catapult launch with a partially filled external tank is not authorized.

Initial catapult firing results in a short-term vertical acceleration of 15 to 20gs caused by full compression of the stored-energy nosestrut. Firmly restrain the throttles to prevent their aft travel during the catapult stroke.

The F-14 must be flown off the catapult by the pilot. At shuttle release, the energy stored in the nose strut is released, rotating the aircraft to the initial flyaway attitude of approximately 12-15 degrees nose-up on the VDI and HUD. The aircrew should plan for the standard excess endspeed of 15 knots, unless notified otherwise. Lower excess endspeed than anticipated or a lower pitch trim setting than recommended will require the pilot to use backstick at the end of the catapult stroke to capture and maintain the desired climbout pitch attitude of 10 degrees. Higher endspeed than expected or a higher pitch trim setting than recommended will require the pilot to stop the rotation at 10 degrees with slight forward stick. While rotating to the flyaway attitude, the flightcrew will feel the aircraft settle approximately 5 feet before commencing a climb. For catapult launches with excess endspeed less than 15 knots, the AOA will rise abruptly to 17 units and then gradually decrease as airspeed increases during the flyaway.



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Figure 8-2. Center-of-Gravity Variation With Fuel Loading

Aircrew coordination is particularly critical in this regime, since the aircrew must ensure that initial flyaway parameters are maintained while remaining alert for any abnormal launch characteristics and engine malfunctions. High endspeed and/or single-engine flyaway with trim settings above 2 degrees may require significant forward stick pressure. In all configurations, the use of afterburner and/or level rapid acceleration will require reduced nose trim settings. The RIO shall scan a repeat of the pilot's heads up display and associated standby flight instruments to ensure the correct flyaway conditions are met (airspeed, altitude and attitude).

Additional considerations exist for night/IFR catapult launches. Aircraft acceleration and the lack of external visual cues will cause the aircrew to sense that the nose is higher than actual and can result in spatial disorientation. Under these conditions, a vigilant instrument scan is required to ensure that the proper attitude is maintained throughout the launch and subsequent climbout.

8.4.3 Catapult Abort Procedures (Day)

If after turnup on the catapult, the pilot determines that the aircraft is down, the pilot gives the no-go signal by

shaking his head from side to side. Never raise the hand into view or make any motion that might be construed as a salute. After the catapult officer observes the pilot's no-go signal, he will cross his forearms over his head, and then give the standard release tension signal. When the catapult is untensioned, the catapult officer will signal the pilot to raise the launch bar. The pilot shall ensure that the throttles are seated in the catapult detent and will raise the launch bar with the LAUNCH BAR ABORT switch.



To avoid damage to the launch bar retract mechanism, do not actuate the LAUNCH BAR ABORT switch with the nosewheel deflected off center.

When the launch bar is clear of the shuttle, the catapult officer will move the shuttle forward of the aircraft launch bar. At this point the aircraft is no longer in danger of being launched. The catapult officer will signal the pilot to lower the launch bar and then step in front of the aircraft and signal the pilot to throttle back.



- If the aircraft is down prior to it being pushed or pulled back for release from the holdback fitting and when directed by the catapult officer, the launch bar shall be raised by the LAUNCH BAR ABORT switch.
- Unkneeling the nosegear while the launch bar is in the catapult track or shuttle will damage the launch bar linkage and bungees. The pilot should unkneel the aircraft only when he is sure that the launch bar is free to rise and upon signal from the catapult officer or taxi director.

If the aircraft is down after the go signal is given, transmit the words “Suspend, Suspend”; however, the flightcrew should be prepared for the catapult stroke and to perform emergency procedures if required.

8.5 LANDING

8.5.1 Carrier Landing Pattern (VFR)

The VFR carrier landing pattern (Figure 8-3) shall be in accordance with the CV NATOPS manual. The pattern starts with the level break at 800 feet and 300 to 350 knots. The break interval will be approximately one-half of the desired ramp interval time (15 to 17 seconds normal interval). When established wings level on the downwind leg, descend to and fly the pattern at 600 feet MSL. Engage DLC upon completion of flap extension.

Note

Selection of DLC during the flap extension cycle can generate excessive pitch rates. DLC is to be selected only upon completion of the flap cycle. DLC must be deselected prior to flap retraction to avoid excessive pitch trim change with automatic DLC stowage during the flap retraction cycle.

Slow to 15 units AOA or computed on-speed (whichever is faster) and verify airspeed/AOA correlation, engage APC if desired, check for proper DLC operation, and complete the Landing Checklist prior to reaching the 180° position. The 180° turn is commenced 1 to 1.2 nm abeam the LSO platform to arrive at the 90° position at approximately 450 feet MSL. The nominal bank angle throughout the turn should be 25° to 27°. Glideslope meatball acquisition will occur at approximately 0.6 nm. Do not descend below 300 feet prior to acquiring the ball. On rollout to final, slightly overshoot the ship's wake. Optimum time on glideslope is approximately 15 to 18 seconds.



- The LSO and tower must be informed if the landing is to be made in any wing or flap configuration other than 20° wing sweep, flaps and slats down, or RATS inoperative, to ensure wind-over-deck requirements are met.
- Do not attempt shipboard landing with inoperative ROLL SAS and store asymmetry greater than 170,000 inch-pounds because of lateral pilot-induced oscillation in the approach unless field divert is not possible. (Example: weapon rail at station 6 and AIM-54 missile at station 8 equals 170,000 inch-pounds.)

Note

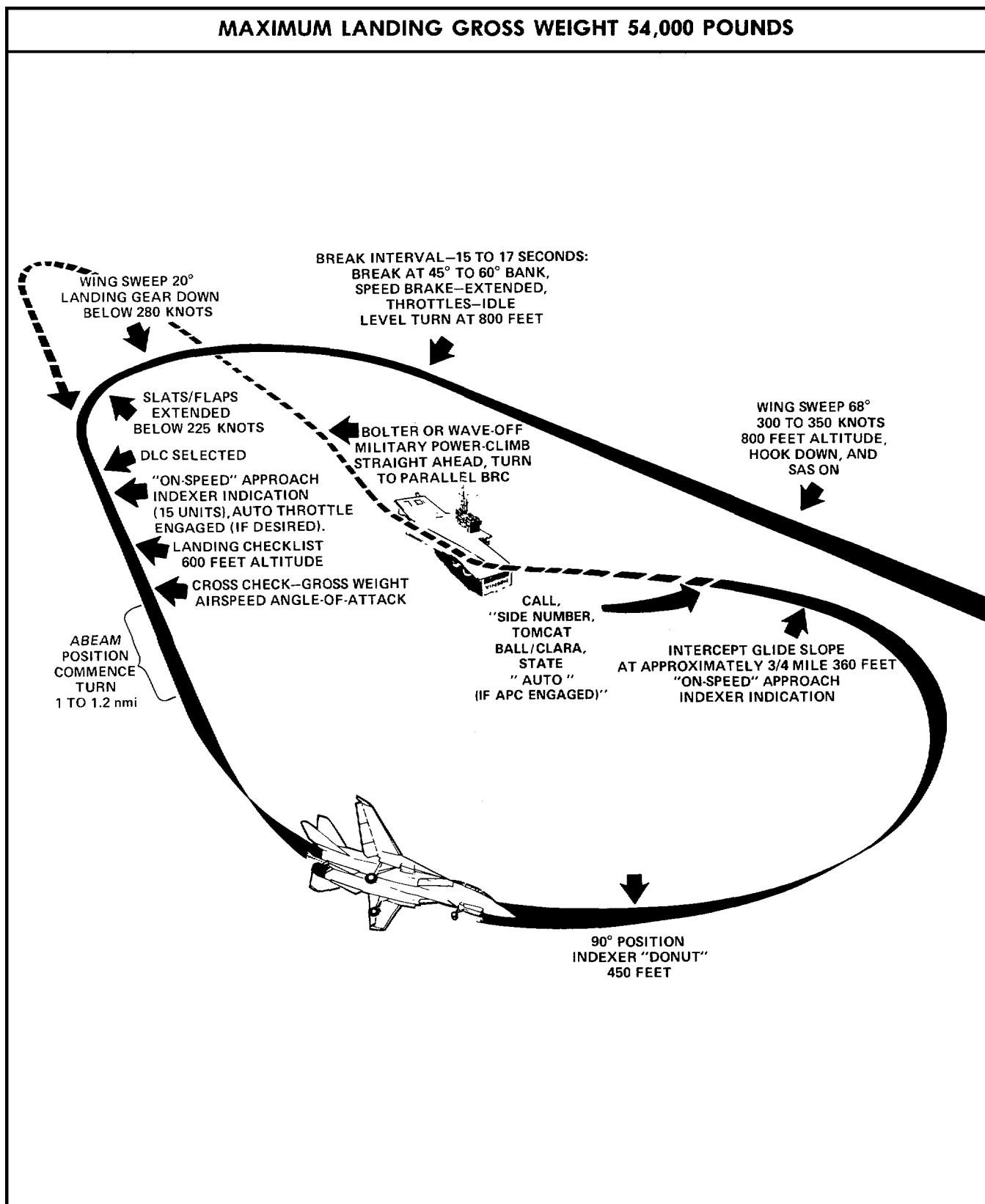
With the hook down, airspeed in excess of 300 knots may cause the hook transition light to illuminate.

8.5.2 Manual Approach Technique

The rapid engine response characteristics allow the pilot to make timely, small amplitude power changes to make glideslope corrections. Because of the rapid engine response and high-throttle sensitivity, the pilot must avoid overcontrolling power. DLC should be engaged for all approaches. Approaches flown without DLC will degrade flying qualities resulting in significant glideslope and lineup deviations. Pitch compensation for DLC inputs is optimized for approach airspeeds. Activation of DLC at higher airspeeds will result in inducing noticeable changes in pitch attitude. DLC may be employed by vernier or bang-bang control depending on the extent of the correction required. DLC is most effective in correcting for glideslope deviations caused by gusty conditions or ship burble. Caution should be taken not to use DLC to compensate for a major overpowered or underpowered condition.



Caution must be taken to avoid sustained full-down DLC commands for a high condition at the ramp as this will result in excessive sink rates and subsequent hard landings.



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Figure 8-3. Carrier Landing Pattern

Once established on glideslope, keep the scan going, cross-checking meatball, lineup, and AOA. Be alert for a waveoff. With rough seas and pitching decks, some erratic meatball movements may be encountered. If this is the case, average out the ball movement to maintain smooth and safe rate of descent. To avoid being “cocked up,” arrest a “come down in close” with power and up DLC. Attempts to arrest high sink rates with nose attitude alone could result in landing damage to the ventral fins and afterburner. Also, avoid dropping the nose prior to touchdown as this significantly increases the chances of a hook skip bolter. Upon touchdown, add full MIL power, manually retract speedbrakes, and maintain aft stick pressure to minimize chances of a hook skip bolter. Selection of MIL power will automatically disengage DLC and retract the speedbrake.

A good start is imperative to minimizing lineup corrections while on the glideslope and will prevent the tendency to chase lineup. Small, coordinated rudder inputs should be used to reduce the nose yaw that is easily generated by lateral stick inputs.

8.5.3 Approach Power Compensator Technique

Practice is required to develop the proper control habits necessary to use the APC. For the APC to perform satisfactorily, smooth attitude control is essential. Large, abrupt attitude changes result in excessive power changes. APC use is not recommended in gusty conditions. The APC will overcontrol AOA fluctuations resulting in large airspeed and/or glideslope deviations. The APC system was designed to be used with the engines operating in the primary mode and is not recommended with either one or both of the engines in secondary mode.

As the initial turn from the 180° position is made, the aircraft will momentarily indicate up to 2 units slow. The APC will adjust power to correct back to onspeed condition throughout the remainder of the turn. Upon rollout on glideslope, the pilot must override the tendency for the nose to pitch up by maintaining slight forward stick. The aircraft will indicate 1 to 2 units fast, which will slow to onspeed within 5 seconds. The use of DLC in conjunction with small attitude changes to maintain glideslope will minimize AOA deviations and result in optimal APC performance. Timely use of DLC can also be used to more rapidly correct from a fast or slow condition. Close-in corrections are very critical. If a high in-close situation develops, the recommended procedure is to stop the meatball motion and not attempt to recenter it. A low in-close condition is difficult to correct with APC and often results in an over-the-top bolter. It may be necessary to disengage or manually override APC in order to safely recover from a low in-close situation. Throughout the approach, the pilot should keep his hand on the throttles in the event APC disengages inadvertently. A smooth throttle transition from AUTO to BOOST mode can be achieved by depressing the CAGE/SEAM button on the inboard throttle grip.

8.5.4 Waveoff Technique

A waveoff will be initiated immediately upon a signal or voice call from the LSO. MIL power should be used for all dual-engine waveoffs. Maintain the landing attitude until a positive rate of climb is established. Do not over rotate the aircraft in close as this significantly increases the chance of in-flight engagement.

WARNING

Dual engine afterburner waveoffs are prohibited. Inadvertent arrestment or in-flight engagement in dual afterburner would result in catastrophic damage to the aircraft and/or arresting gear.

Normally, waveoffs will be taken straight ahead, especially when close in. When using APC, waveoff technique is the same as for manual approaches except that a force of approximately 8 pounds is required to disengage the throttle torque switches. Disengagement of the APC by overriding the throttle forces results in the throttle MODE switch automatically returning to BOOST and illuminates the AUTO THROT light on the pilot left-hand ladder light assembly. A time delay relay holds the AUTO THROT light on for 10 seconds following APC disengagement.

CAUTION

If a force in excess of 14 pounds is applied to break the throttles out of the automatic mode, the throttle MODE switch will return to BOOST but the throttle mode will revert to manual. The switch must be cycled to MAN and back to BOOST to regain the BOOST mode.

8.5.5 Bolter Technique

The bolter maneuver is effected by selecting MIL and slight aft control stick until the desired flyaway attitude is established.

CAUTION

The use of excessive backstick on a bolter may cause the tail surface to stall, delaying aircraft rotation and causing the aircraft to settle off the angle.

8.5.6 Bingo Fuel

Fuel reserves should be programmed depending on distance of the field from the CV, aircraft configuration, and en route weather. This bingo fuel quantity should be set before takeoff.

8.5.7 Arrested Landing and Exit From the Landing Area

As the aircraft touches down, advance throttles to MIL. Upon completion of landing rollout, reduce power to IDLE. Raise the hook and flaps and select wing-sweep BOMB while allowing the aircraft to roll aft. Apply brakes on signal. Flaps retraction requires approximately 7 seconds. When the flaps are fully retracted the wings will sweep aft. Engage nosewheel steering and taxi forward on the come-ahead signal. If the wings sweep aft to 55°, auxiliary and main flap retraction has been verified and full-aft wing sweep may be selected using the emergency handle. The RIO should monitor wing-sweep position while taxiing. Oversweep should be selected prior to final spot and shutdown. The engines should remain running until the cut signal is given by the plane director. If at any time during this phase of operations a brake failure occurs, pull the parking brake. If the aircraft continues to roll, drop the hook, advise the tower, and signal for chocks to be installed. Use nosewheel steering to ensure that the aircraft remains on the deck. Do not unstrap, dearm the ejection seat, or leave the cockpit until tiedowns have been installed.

Note

Aircrew shall inform tower in the event of RATS failure on landing.

8.5.8 Carrier-Controlled Approaches

Should these procedures conflict with the applicable CV Air Operations manual, the latter shall govern. Detailed pilot-controller voice procedures must be established in accordance with each ship's CCA doctrine. Figure 8-4 shows a typical carrier-controlled approach. Mode I, mode IA, and mode II ACLS approaches are described in Chapter 17, Automatic Carrier Landing System. Aircrew should have a thorough understanding of this chapter and the DFCS and APC portions of Chapter 2 prior to attempting a coupled ACLS approach.

8.5.9 Hold Phase

Five minutes before penetration, defogging shall be actuated and maximum comfortable interior temperature will be maintained to prevent possible fogging or icing on the windshield and canopy.

Note

Fuel dump is accomplished by gravity flow and its effectiveness is reduced during the penetration descent. Fuel dump, if required, should be planned accordingly for the level leg.

1. Before descent, check shoulder harness handle locked, set lights as directed by existing weather, and lower arresting hook.

2. Accomplish final changes to radio and IFF upon departing marshal or earlier. After these changes are made, the pilot should make no further changes except under emergency conditions.
3. When commencing penetration, initiate a standard descent: 250 knots, 4,000 fpm, speedbrakes as required.

WARNING

If a gear and/or flaps down penetration is required, ensure that the wings are programmed forward of 22° prior to lowering flaps. If flaps are lowered with wings swept aft of 22°, auxiliary flap extension will be inhibited resulting in rapid nosedown pitch rates.

4. Radar and barometric altimeters shall be cross-checked continuously when below 5,000 feet.

8.5.10 Platform

At 20 miles passing through 5,000 feet, aircraft descent shall be slowed to 2,000 fpm. At this point, a mandatory, unacknowledged voice report will be broadcast by each pilot. The aircraft side number will be given and "platform" will be reported. Continue descent to 1,200 feet.

8.5.11 Ten-Mile DME Fix

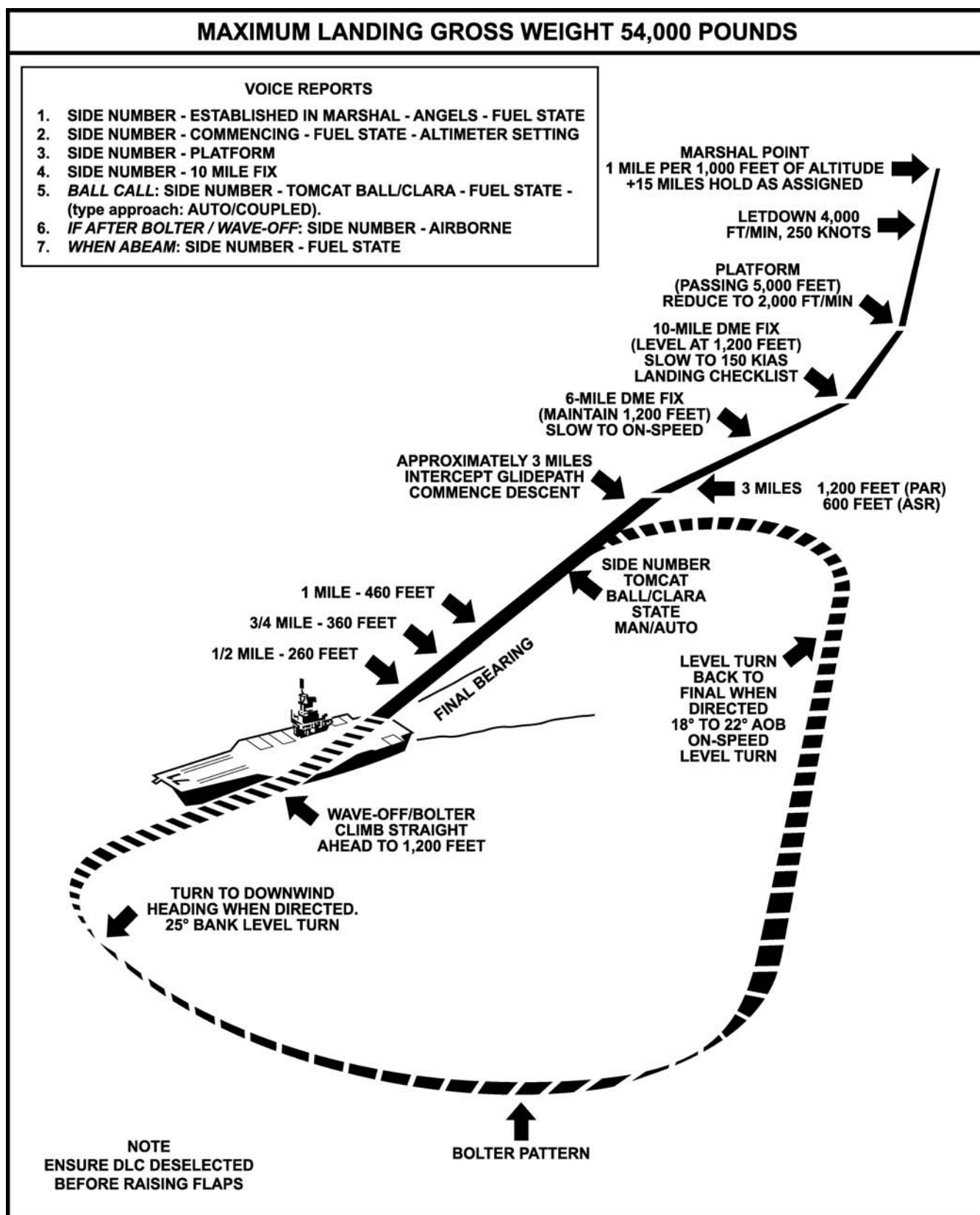
1. Commence transition to landing configuration, unless otherwise directed by CCA, maintaining 1,200 feet.
2. Gear and flaps shall be down by 8 miles.
3. Complete the landing checklist. Check anti-ice, lights, and rain removal, as required.

8.5.12 Six-Mile DME Fix

For a precision radar approach, maintain 1,200 feet at approach speed until intercepting the glidepath at 3 to 3.25 miles, unless otherwise directed.

For an air surveillance radar approach, a gradual descent of 600 fpm can be commenced departing the 6-mile DME fix. Maintain 600 feet until the aircraft intercepts the center of the glideslope at 1¼ to 1½ miles on a 3.5° slope. Commence a descent of 500 to 700 fpm, using the following checkpoints:

1. 1 mile — 460 feet.
2. ¾ mile — 360 feet.
3. ½ mile — 260 feet.



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Figure 8-4. Carrier-Controlled Approach (Typical)

8.5.13 Meatball Contact

When transitioning to a visual approach (at approximately $\frac{3}{4}$ of a mile), make a report call with the following information: side number, TOMCAT, meatball or Clara (no meatball), fuel state, and type pass. The LSO will acknowledge, and instructions from the final controller will cease. Pilots are cautioned against premature contact reports and transition to visual glideslope during night recoveries when visibility permits sighting the ship beyond 2 to 3 miles. The height and dimension of the entire lens or mirror optical beam at $1\frac{1}{4}$ miles is over 200 feet and the true center cannot be distinguished. This, coupled with the relatively short length of the runway lights, will give the pilot the illusion of being high when, in fact, the aircraft may be well below optimum glideslope. An additional advantage of delaying the meatball report (even though the ball is in sight) is that the final controller will continue lineup instructions that can greatly assist the pilot in establishing satisfactory lineup. Use the vertical velocity indicator to set up a rate of descent of 500 to 700 fpm. The AN/ARA-63 instrument landing system (ILS) is an excellent aid during the approach and should be used whenever possible. ILS glideslope azimuth and elevation signals are provided as command "fly to" indications and are displayed via the VDI and/or the HUD in the TLN mode.

8.6 WAVEOFF AND BOLTER

In the event of a waveoff or bolter, climb straight ahead to 1,200 feet and maintain 150 knots. When directed by CCA, initiate a level turn to the downwind leg reporting abeam with fuel state. (If no instructions are received within 2 minutes or 4 miles DME, attempt radio contact; if unable, assume communications failure and initiate the downwind turn to the reciprocal of final bearing reporting abeam with fuel state. If no acknowledgment is received, start a turn at 4 miles or 2 minutes to intercept final bearing.) A 20° bank angle at 150 knots on the upwind turn establishes the aircraft at the desired 2 miles abeam on the downwind leg.

CATCC clears the aircraft to turn inbound to intercept final bearing. A level, on-speed approach turn of 18° to 22° bank angle from the normal downwind position allows the aircraft to properly intercept final bearings at a minimum of 3 miles aft of the ship. Traffic spacing ahead may require that the aircraft continue on downwind leg well past the normal abeam position before being directed to turn to final bearing. No attempt should be made to establish visual contact with the ship when executing a CCA until the final approach turn has been executed.

Note

The radar beacon (AN/APN-154) should be turned off as soon as practicable after landing to avoid causing interference with AN/SPN-42 control of other aircraft in the pattern.

8.7 NIGHT FLYING

Night carrier operations will have a much slower tempo than daylight operations and it is the pilot's responsibility to maintain this tempo. Normal day carrier operations shall be used except as modified below.

8.7.1 Briefing

Before initial night flight operations, all pilots should receive an additional briefing from the following persons:

1. Flight deck officer
2. Catapult officer
3. Arresting gear officer
4. LSO
5. CATCC.

Individual flight briefings will include all applicable items outlined above, with particular emphasis on weather and bingo fuel.

8.7.2 Preflight

In addition to normal cockpit preflight, ensure that external light switches are properly positioned for poststart light check. Install night filters on applicable cockpit displays.

8.7.3 Poststart

Adjust cockpit light to desired brightness. When ready for taxi, indicate with appropriate signal.

8.7.4 Taxi

Night deck-handling operations are of necessity slower than those used during the day. When a doubt arises as to the meaning of a signal from a taxi director, stop.

8.7.5 Catapult Hookup (Night)

Procedures for aircraft catapult hookup at night are identical to those used during day operations. However, it is difficult to determine your speed or degree of motion over the deck. The pilot must rely upon, and follow closely, the plane director's signals.

8.7.6 Catapult Launch

On turnup signal from the catapult officer ensure throttles in MIL and check all instruments. When ready for launch, place external light master switch ON (bright and steady). After launch, establish an 8° to 10° pitch attitude, cross-checking instruments to ensure a positive rate of climb. Retract the landing gear. An altitude of 500 feet is considered to be minimum altitude for retraction of flaps.

When well established in a climb, switch lights to flashing or as applicable for an instrument climbout. The standby indicator should be used in the event of a primary display(s) malfunction.

WARNING

If wings sweep back inadvertently, close attention should be paid to maintaining positive rates of climb. The loss of lift incurred by premature wing sweep aft can result in significantly decreased rates of climb, with very little change in pitch attitude and trim requirements.

8.7.7 Catapult Abort Procedures (Night)

The pilot no-go signal for night launches will be to not turn on the exterior lights, and to transmit on the land/launch frequency the aircraft side number, the catapult the aircraft is on, and the words "Suspend, Suspend." After the catapult is untensioned, the catapult officer will signal to raise the launch bar. The pilot shall ensure that the throttles are seated in the catapult detent or throttle friction is full forward before raising the launch bar with the LAUNCH BAR ABORT switch. When the launch bar is clear of the shuttle, the catapult officer will move the shuttle forward of the aircraft launch bar. At this point the aircraft is no longer in danger of being launched. The catapult officer will signal the pilot to lower the launch bar and then step in front of the aircraft and signal the pilot to throttle back.

WARNING

If the aircraft is down after the go signal is given, transmit the words "Suspend, Suspend"; however, the flightcrew should be prepared for the catapult stroke and to perform emergency procedures if required.

CAUTION

- If the aircraft is down prior to it being pushed or pulled back for release from the holdback fitting and when directed by the catapult launching officer, the launch bar shall be raised by the LAUNCH BAR ABORT switch.
- Unkneeling the nosegear while the launch bar is in the catapult track or shuttle will damage the launch bar linkage and bungees. The pilot should unkneel the aircraft only when sure that the launch bar is free to rise and upon signal from the catapult officer or taxi director.

8.7.8 Arrested Landing and Exit From Landing Area (Night)

During approach, all lights shall be on bright and steady. At the end of arrestment rollout, turn off external lights and follow the director's signals while effecting the normal aircraft cleanup procedures.

7.9.2 Takeoff

The takeoff will be individual.

7.9.3 Radio Procedures and Pattern Entry

A radio check with Paddles is advisable before pattern entry to confirm Charlie time. Approaches to the field for break will be controlled by the tower and then switched to Paddles for FCLP pattern control. At no time will an aircraft remain in the pattern without a UHF receiver. On each succeeding pass, the following voice report will be made at normal meatball acquisition positions:

1. Side number
2. TOMCAT
3. Ball/Clara
4. Fuel state
5. Type of approach, if appropriate (automatic, degraded, etc.).

7.9.4 Pattern

The pattern should be a racetrack with the 180° approximately 1¼ miles abeam at 600 feet above field eleva-

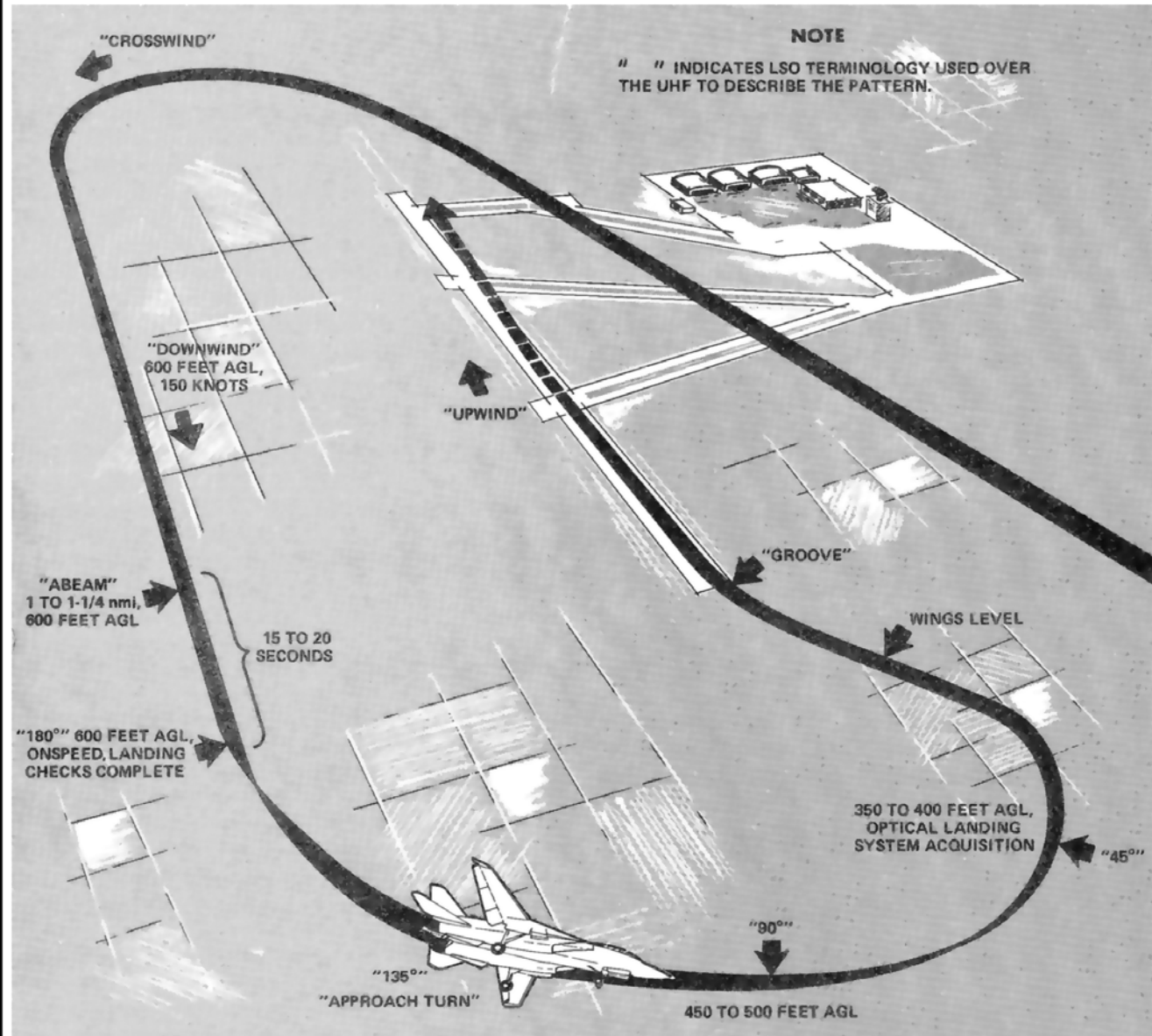
tion (see [Figure 7-4](#)). The length of the groove should be adjusted to give a wings-level descent on the glideslope of 15 to 18 seconds (approximately ¾ mile). For maximum gross weight at touchdown, refer to Chapter 4, Operating Limitations. The turn to the downwind leg should be commenced after climbing to pattern altitude (600 feet AGL) utilizing 30° angle of bank and 150 KCAS. Turning from the 180°, power should be adjusted to maintain optimum angle of attack. A gradual descent may be commenced at this position with a minimum altitude of 450 feet AGL at the 90° position and 350 feet AGL as a minimum until the pilot is receiving glideslope information. At approximately 45°, the meatball appears on the Fresnel lens. Fly a rate of descent such that the ball is centered as the aircraft arrives wings-level in the groove. For manual, automatic, and DLC approach techniques, refer to Carrier-Based Procedures, Chapter 8.

7.9.5 Night FCLP

All provisions that apply to day FCLP also apply to night FCLP, plus the following items:

1. External lights — BRIGHT and STEADY.
2. Hook bypass switch — FIELD.

When comfortably situated in the pattern, instruments should be flown as much as possible up to the 45° position.



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Figure 7-4. Field Carrier Landing Practice