

CHAPTER 3

AIRCRAFT HANDLING: CV, CVN, AND SHORE STATIONS

This chapter deals with the routine handling of aircraft on the flight and hangar decks of aircraft carriers and on shore stations. It provides a general overview of aircraft handling signals, procedures, and publications. The task of handling aircraft, whether on ship or ashore, requires complete attention to detail, thorough knowledge of handling procedures, and documented qualifications. As an ABH, you are expected to handle aircraft in a confident and responsible manner. Professionalism and pride in your work are minimum standards for success. Understanding the contents of this chapter will greatly assist you in the daily routine of aircraft handling.

GENERAL AIRCRAFT HANDLING SIGNALS

OBJECTIVES: Identify standard aircraft handling signals. Describe the various applications of hand signals.

The aircraft handling signals discussed in this section are used in identical form by all aviation branches of the United States Armed Forces. These signals are illustrated and defined in figure 3-1 (sheets 1 through 16). Personnel who wish to obtain in-depth information concerning aircraft signals should refer to NAVAIR 00-80T-113 *Aircraft Signals NATOPS Manual*.

NOTE

Signals 1 through 32 and 34 through 42 in figure 3-1 are NATO-approved. Signals 43 through 64 are for use in the U.S. Navy Department only.

CARRIER FLIGHT DECK HANDLING SIGNALS

The aircraft handling signals included in this section pertain to those used aboard aircraft carriers. Signals are included in individual *Naval Air Training and Operating Procedures Standardization (NATOPS)* flight manuals for those signals peculiar to each aircraft.

Launching Signals

See figure 3-2 (sheets 1 through 8, numbers 1 through 21) for launching signals that are being used.

Landing Signals

See figure 3-3 (sheets 1 through 3, numbers 1 through 8) for landing signals used. Signals numbered 3, 4, 7, and 8 are NATO-approved.

Handling Signals

See figure 3-4 (sheets 1 and 2, numbers 1 through 6) for the handling signals used. Signals 1 and 2 are approved by NATO.

Refueling Signals

See figure 3-5, numbers 1 through 10 for the refueling signals used.

Aircraft Elevator Signals


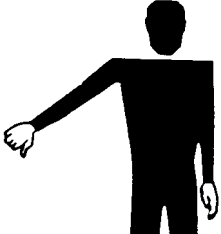


See figure 3-6, numbers 1 through 4 for the elevator operation signals used.

GENERAL COMMENTS

The beginner must first learn the signals thoroughly, then practice them to ensure precise execution. If the arm is to be dropped to indicate application of a brake on a turn, snap your arm out briskly. If your arms are to be stretched out in rendering a signal, open them wide. When possible, keep your hands well separated. It is better to exaggerate a signal than to make it in such a manner that it may be misinterpreted.

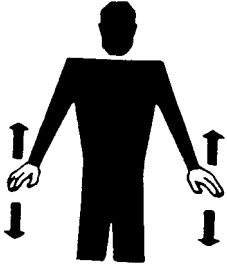



The emergency STOP signal is used more frequently aboard aircraft carriers than on shore stations. Remember, however, the emergency STOP is meant for emergencies only. It should not be used as a routine STOP signal.

It is sometimes necessary for an aircraft director to give **COME AHEAD SLOWLY** signal in close

SIGNAL	DAY	NIGHT	REMARKS
<p>①</p>  <p>AFFIRMATIVE (ALL CLEAR)</p>	Hand raised, thumb up.	Same as day signal with addition of wands.	Conforms to ICAO signal.
<p>②</p>  <p>NEGATIVE (NOT CLEAR)</p>	Arm held out, hand below waist level, thumb turned downwards.	Same as day signal with addition of wands.	
<p>③</p>  <p>PROCEED TO NEXT MARSHALER</p>	Right or left arm Down, other arm moved across the body and extended to indicate direction to next marshal.	Same as day signal with addition of wands.	Conforms to ICAO signal.
<p>④</p>  <p>THIS WAY</p>	Arms above head in vertical position with palms facing inward.	Same as day signal with addition of wands.	Conforms to ICAO signal.





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Figure 3-1.—General aircraft handling signals (sheet 1; numbers 1 through 4).

SIGNAL	DAY	NIGHT	REMARKS
<p>⑤</p>  <p>SLOW DOWN</p>	Arms down with palms towards ground, then moved up and down several times.	Same as day signal with addition of wands.	Conforms to ICAO signal.
<p>⑥</p>  <p>TURN TO LEFT</p>	Extend right arm horizontally, left arm is repeatedly moved upward. Speed of arm movement indicating rate of turn.	Same as day signal with addition of wands	<p>1. Clench fist (day), or down-turned wand (night), means for pilot to lock indicated brake.</p> <p>2. Also used for spot turns airborne aircraft. Conforms to ICAO signal.</p>
<p>⑦</p>  <p>TURN TO RIGHT</p>	Extend left arm horizontally, right arm is repeatedly moved upward. Speed of arm movement indicating rate of turn.	Same as day signal with addition of wands	<p>1. Clench fist (day), or down-turned wand (night), means for pilot to lock indicated brake.</p> <p>2. Also used for spot turns airborne aircraft. Conforms to ICAO signal.</p>
<p>⑧</p>  <p>MOVE AHEAD</p>	Arm extended from body and held horizontal to shoulders with hands up-raised and above eye level, palms facing backwards. Execute beckoning arm motion angled backward. Rapidity indicates speed desired of aircraft.	Same as day signal with addition of wands	




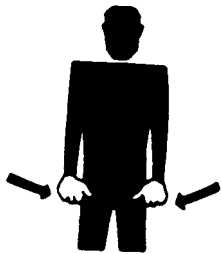
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Figure 3-1.—General aircraft handling signals (sheet 2; numbers 5 through 8).

SIGNAL	DAY	NIGHT	REMARKS
<p>9</p>  <p>STOP</p>	Arms crossed above the head, palms facing forward.	Same as day signal with addition of wands.	
<p>10</p>  <p>BRAKES</p>	<p>ON - Arms above head, open palms and fingers raised with palms toward aircraft, then fist closed.</p> <p>OFF - Reverse of above.</p>	<p>ON - Arms above head, then wands crossed.</p> <p>OFF - Crossed wands, then uncrossed.</p>	
<p>11</p>  <p>MOVE BACK (ALSO USED TO PULL BACK AIRCRAFT UTILIZING ARRESTING WIRE)</p>	Arms by sides, palms facing forward, swept forward and upward repeatedly to shoulder height.	Same as day signal with addition of wands.	Conforms to ICAO signal.
<p>12</p>  <p>TURNES WHILE BACKING (TAIL TO LEFT)</p>	Point right arm down and left arm brought from overhead, vertical position to horizontal position repeating left arm movement.	Same as day signal with addition of wands	Conforms to ICAO signal.

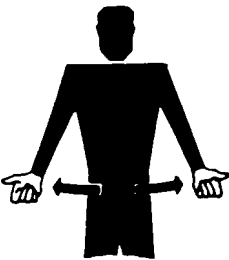



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Figure 3-1.—General aircraft handling signals (sheet 3; numbers 9 through 12).

SIGNAL	DAY	NIGHT	REMARKS
<p>13</p>  <p>Turns while backing (tail to right)</p>	<p>Point left arm down and right arm brought from overhead, vertical position to horizontal forward position, repeating right arm movement.</p>	<p>Same as day signal with addition of wands.</p>	<p>Conforms to ICAO signal.</p>
<p>14</p>  <p>Clearance for personnel to approach aircraft</p>	<p>A beckoning motion with right hand at eye level.</p>		
<p>15</p>  <p>Personnel approaching the aircraft</p>	<p>Left hand raised vertically overhead, palm towards aircraft. The other hand indicates to personnel concerned and gestures towards aircraft.</p>	<p>Same as day signal with addition of wands.</p>	
<p>16</p>  <p>Insert chocks</p>	<p>Arms down, fists closed, thumbs extended inwards, swing arms from extended position inwards.</p>	<p>Same as day signal with addition of wands.</p>	<p>Conforms to ICAO signal.</p>



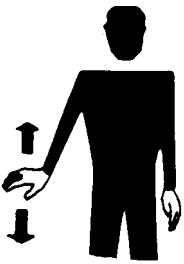
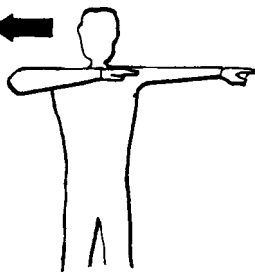
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Figure 3-1.—General aircraft handling signals (sheet 4; numbers 13 through 16).

SIGNAL	DAY	NIGHT	REMARKS
<p>(17)</p>  <p>REMOVE CHOCKS</p>	Arms down, fists closed, thumbs extended outwards, swing arms outwards.	Same as day signal with addition of wands.	Conforms to ICAO signal.
<p>(18)</p>  <p>INSTALL DOWN LOCKS/ UNDERCARRIAGE PINS</p>	With arms above head, the right hand clasps left forearm and the left fist is clenched.	Similar to the day signal except the right wand is placed against left forearm. The wand in the left hand is held vertical.	
<p>(19)</p>  <p>REMOVE DOWN LOCKS/ UNDERCARRIAGE PINS</p>	With arms and hands in "install down locks" position, the right hand unclasps the left forearm.	Similar to the day signal except with the addition of wands.	
<p>(20)</p>  <p>CONNECT GROUND ELECTRICAL POWER SUPPLY</p>	Hands above head, left fist partially clenched, right hand moved in direction of left hand with first two fingers extended and inserted into circle made by fingers of the left hand.	Same as day signal with addition of wands.	Same signal for air start unit except using two fingers (day).



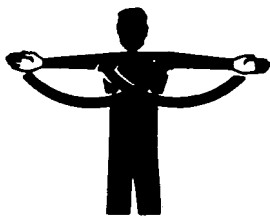
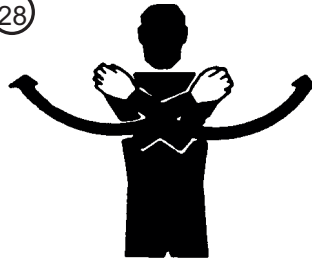
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Figure 3-1.—General aircraft handling signals (sheet 5; numbers 17 through 20).

SIGNAL	DAY	NIGHT	REMARKS
<p>(21)</p>  <p>DISCONNECT GROUND ELECTRIC POWER SUPPLY</p>	<p>Hands above head, left fist partially clenched, right hand moved away from the left hand, withdrawing first two fingers from circle made by fingers of the left hand.</p>	<p>Same as day signal with addition of wands.</p>	<p>Same signal for air start unit except using two fingers (day).</p>
<p>(22)</p>  <p>START ENGINE(S)</p>	<p>Left hand overhead with appropriate number of fingers extended, to indicate the number of the engine to be started, and circular motion of right hand at head level.</p>	<p>Similar to the day signal except that the wand in the left hand will be flashed to indicate the engine to be started.</p>	<p>Conforms to ICAO signal.</p>
<p>(23)</p>  <p>SLOW DOWN ENGINE(S) ON INDICATED SIDE</p>	<p>Arms down with palms toward ground, then either right or left arm waved up and down indicating that left or right side engines respectively should be slowed down.</p>	<p>Same as day signal with addition of wands.</p>	<p>Conforms to ICAO signal.</p>
<p>(24)</p>  <p>CUT ENGINE(S)</p>	<p>Either arm and hand level with shoulder, hand moving across the throat, palm down. Hand is moved sideways, arm remaining bent. Other arm pointing to engine.</p>	<p>Same as day signal with addition of wands.</p>	


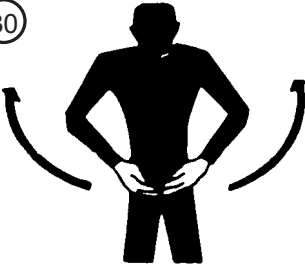


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Figure 3-1.—General aircraft handling signals (sheet 6; numbers 21 through 24).

SIGNAL	DAY	NIGHT	REMARKS
<p>(25)</p>  <p>LOCK TAILWHEEL</p>	<p>Hands together overhead, opened from the wrists in a V , then closed suddenly.</p>	<p>Same as day signal with addition of wands.</p>	
<p>(26)</p>  <p>UNLOCK TAILWHEEL</p>	<p>Hands overhead, palms together, then hands opened from the wrists to form a V, wrists remaining together.</p>	<p>Same as day signal with addition of wands.</p>	
<p>(27)</p>  <p>FOLD WINGS/ HELICOPTER BLADES</p>	<p>Arms straight out at sides, then swept forward and hugged around shoulders.</p>	<p>Same as day signal with addition of wands</p>	
<p>(28)</p>  <p>SPREAD WINGS/ HELICOPTER BLADES</p>	<p>Arms hugged around shoulders, the swept straight out to the sides.</p>	<p>Same as day signal with addition of wands</p>	

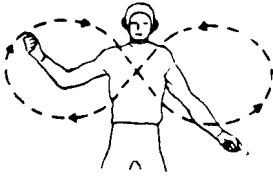

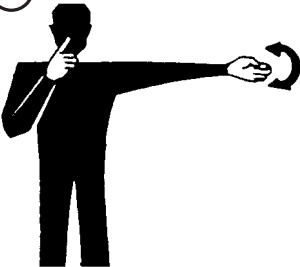

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Figure 3-1.—General aircraft handling signals (sheet 7; numbers 25 through 28).

SIGNAL	DAY	NIGHT	REMARKS
<p>(29)</p>  <p>LOCK WINGS/ HELICOPTER BLADES</p>	Hit right elbow with palm of left hand.	Same as day signal with addition of wands.	
<p>(30)</p>  <p>OPEN WEAPON BAY(S) DOOR(S)</p>	Body bent forward at the waist, hands held with fingertips touching in front of body and elbows bent at approximately 45°, then arms swing downward and outward.	Same as day signal with addition of wands.	
<p>(31)</p>  <p>CLOSE WEAPON BAY(S) DOOR(S)</p>	Body bent forward at the waist and arms extended horizontally, then arms swing downward and in until fingertips touch in front of the body with elbows bent at approximately 45°.	Same as day signal with addition of wands	
<p>(32)</p>  <p>TAKE OFF</p>	Director conceals left hand and makes circular motion of right hand over head in horizontal plane ending in a throwing motion of arm towards direction of takeoff.	Same as day signal with addition of wands	





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Figure 3-1.—General aircraft handling signals (sheet 8; numbers 29 through 32).

SIGNAL	DAY	NIGHT	REMARKS
<p>33</p>  <p>FIRE</p>	Describes large figure eight with one hand and point to the fire area with the other hand.	Same, except with wands.	Signal is meant for information only. Pilot should be given a cut engine or continuous turnup signal, as appropriate.
<p>34</p>  <p>ENGAGE NOSEGEAR STEERING</p>	Point to nose with index finger while indicating direction of turn with other index finger.	Same as day signal with addition of wands.	
<p>35</p>  <p>DISENGAGE NOSEGEAR STEERING</p>	Point to nose with index finger, lateral wave with open palm of other hand at shoulder height.	Same as day signal with addition of wands.	
<p>36</p>  <p>LOWER WING FLAPS</p>	Hands in front, palms together horizontally then opened from the wrist crocodile-mouth fashion.	Same as day signal with addition of wands.	


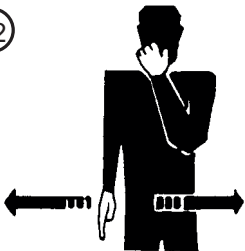


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Figure 3-1.—General aircraft handling signals (sheet 9; numbers 33 through 36).

SIGNAL	DAY	NIGHT	REMARKS
<p>(37)</p>  <p>RAISE WING FLAPS</p>	<p>Hands in front horizontally, with palms open from the wrists, then suddenly closed.</p>	<p>Same as day signal with addition of wands.</p>	
<p>(38)</p>  <p>DOWN HOOK</p>	<p>Right fist, thumb extended downward, lowered suddenly to meet horizontal palm of left hand.</p>	<p>Same as day signal with addition of wands.</p>	
<p>(39)</p>  <p>UP HOOK</p>	<p>Right fist, thumb extended upward, raised suddenly to meet horizontal palm of left hand.</p>	<p>Same as day signal with addition of wands.</p>	
<p>(40)</p>  <p>OPEN AIR BRAKES</p>	<p>Hands in front, palms together vertically. Then opened from the wrists crocodile-mouth fashion.</p>	<p>Same as day signal with addition of wands.</p>	

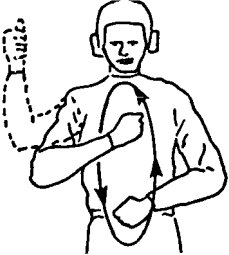
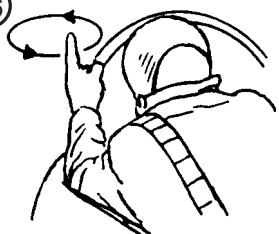
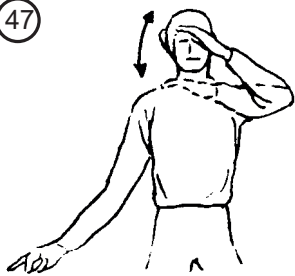
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Figure 3-1.—General aircraft handling signals (sheet 10; numbers 37 through 40).

SIGNAL	DAY	NIGHT	REMARKS
<p>41</p>  <p>CLOSE AIR BRAKES</p>	<p>Hands in front vertically, with palms open from the wrists, then suddenly closed.</p>	<p>Same as day signal with addition of wands.</p>	
<p>42</p>  <p>TILLER BAR/STEERING ARM IN PLACE</p>	<p>Hold nose with left hand, right hand moving horizontally at waist level.</p> <p>a. Affirmative signal immediately following means: MAN IS TENDING BAR.</p> <p>b. A negative signal immediately following means: NO ONE TENDING BAR.</p>	<p>Same as day signal with addition of wands.</p>	
<p>43</p>  <p>REMOVE TIEDOWNS (director)</p>	<p>To tiedown crew: Makes wiping motion down left arm with right hand.</p>	<p>Same as day except with wands.</p>	
<p>44</p>  <p>INSTALL TIEDOWNS (director)</p>	<p>To tiedown crew: Rotates hands in a circle perpendicular to and in front of his body.</p>	<p>Same as day except with wands.</p>	




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Figure 3-1.—General aircraft handling signals (sheet 11; numbers 41 through 44).

SIGNAL	DAY	NIGHT	REMARKS
<p>(45)</p>  <p>TIEDOWNS IN PLACE (director)</p>	Same signal as "install tiedown," followed by thumbs up.	Same as day except with wands.	
<p>(46)</p>  <p>ENGINE RUNUP (pilot)</p>	Moves forefinger in a circular motion in view of director to indicate that he is ready to run up engines.	Makes circular motion with hand held light.	Director responds with same signal (wand at night) to indicate "clear to run up."
<p>(47)</p>  <p>HOT BRAKES</p>	Makes rapid fanning motion with one hand in front of face and points to wheel with other hand.	Same as day except with wands.	
<p>(48)</p> <p>BRAKE FAILURE (tailhook equipped aircraft) (pilot)</p>	Pilot drops tailhook and turns on external lights as an emergency signal to the director and deck crew.	Same as day.	Pilot also informs tower via radio.


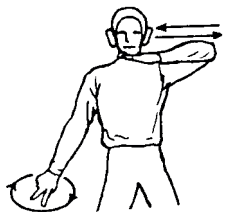
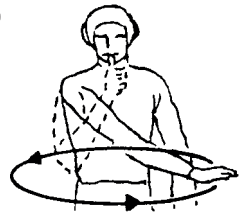

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Figure 3-1.—General aircraft handling signals (sheet 12; numbers 45 through 48).

SIGNAL	DAY	NIGHT	REMARKS
<p>(49)</p>  <p>LIGHTS</p>	Points to eyes with two fingers to signal "lights on."	Flashing wands.	When lights are already on, same signal is used to signal "lights off."
<p>(50)</p>  <p>I HAVE COMMAND</p>	Hold one hand open, motionless and high above head, with palm forward.	Same as day except with wand.	
<p>(51)</p>  <p>OPEN COWL FLAPS</p>	Hold hands against side of head; then open hands by moving thumbs forward and outward.	Same as day except with wands.	
<p>(52)</p> <p>CONNECT/DISCONNECT AIR STARTING UNIT</p>			Same as "connect/disconnect ground electrical power supply," except using one finger (day). (See signals 20 and 21.)

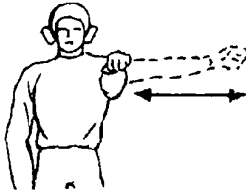
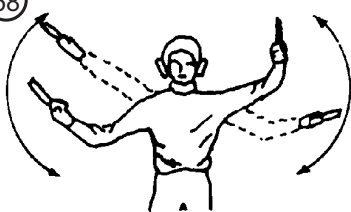

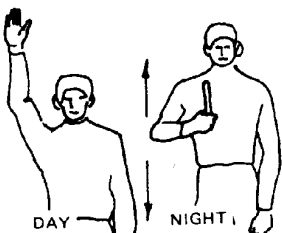
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Figure 3-1.—General aircraft handling signals (sheet 13; numbers 49 through 52).

SIGNAL	DAY	NIGHT	REMARKS
<p>(53)</p>  <p>START AIRCRAFT AUXILIARY POWER UNIT</p>	<p>Points to power unit exhaust with left hand index finger; moves right hand in horizontal circle, index and middle finger pointing downward.</p>	<p>Same as day except with wands.</p>	
<p>(54)</p>  <p>STOP AIRCRAFT AUXILIARY POWER UNIT</p>	<p>Makes "throat cutting" action with left hand; moves right hand in horizontal circle, index and middle fingers pointing downward.</p>	<p>Same as day except with wands.</p>	
<p>(55)</p>  <p>GROUND REFUELING ALL TANKS, NO EXTERNAL POWER (ground crewman)</p>	<p>Extends arm in front of body and makes a wide circular wiping motion; then brings thumb to mouth as if drinking from a glass.</p>	<p>Same except with wand held vertically.</p>	<p>Pilot extends air refueling probe and sets switches for fueling all tanks.</p>
<p>(56)</p>  <p>GROUND REFUELING, IN- TERNAL TANKS ONLY, NO EXTERNAL POWER (ground crewman)</p>	<p>Makes a circular motion as if rubbing stomach with palm of hand; then brings thumb to mouth as if drinking from a glass.</p>	<p>Same as day except with wand.</p>	<p>Pilot extends air refueling probe and sets switches for fueling internal tanks only.</p>

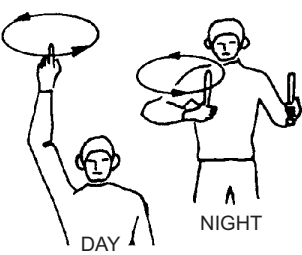
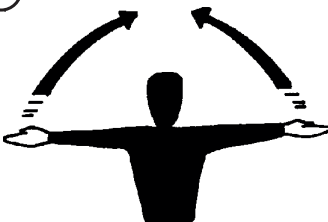
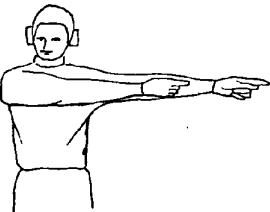

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Figure 3-1.—General aircraft handling signals (sheet 14; numbers 53 through 56).

SIGNAL	DAY	NIGHT	REMARKS
<p>(57)</p>  <p>EXTEND/RETRACT AIR REFUELING PROBE OR RAM AIR TURBINE</p>	<p>TO EXTEND: Extend arm straight ahead, fist clenched; swing arm 90° to side. Use left or right arm according to location of probe.</p> <p>TO RETRACT: Use the reverse of the EXTEND signal</p>	Same as day except with wand.	Pilot actuates probe on signal.
<p>(58)</p>  <p>NEED AIRCRAFT STARTING UNIT</p>	Extend arms out from body (curved upwards) and rotate arms in a clockwise/ counterclockwise motion.	Same as day except with wands.	
<p>(59)</p>  <p>FUEL DISCHARGE DURING START</p>	Left arm raised above shoulder with number of fingers extended to indicate affected engine; right hand describes a pendulum motion between waist and knees.	Similar to day signal except that wand in left hand will be flashed to indicate the number of the affected engine.	Signal is for information only; pilot should be given cut engine or continuous turnup signal, as appropriate.
<p>(60)</p>  <p>AIR WATER INJECTION (AV-8)</p>	Give FINAL TURNUP signal. Chapter 4 (No. 9). Wait 2 or 3 seconds while pilot turns up military rated thrust and checks instruments. Then, hold open hand toward pilot, fingers extended vertically.	Same except hold GREEN wand vertically and move up and down.	<p>Day - Pilot acknowledges by salute.</p> <p>Night - Pilot acknowledges by turning on light to steady dim.</p>

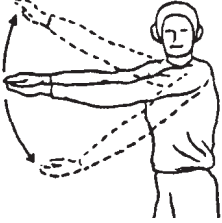


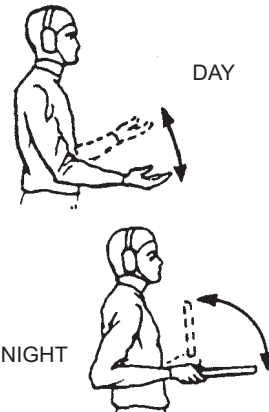
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Figure 3-1.—General aircraft handling signals (sheet 15; numbers 57 through 60).

SIGNAL	DAY	NIGHT	REMARKS
<p>61</p>  <p>DAY NIGHT</p> <p>ENGINE THRUST CHECK (AV-8)</p>	<p>Extend arm overhead, forefinger pointing up. Hesitate, then rotate hand rapidly in a horizontal circle.</p>	<p>Hold RED and GREEN wands at chest level, rotating the green wand in a horizontal circle.</p>	<p>Signal is optional, given at request of pilot. Also can be used for deck launch.</p>
<p>62</p>  <p>VTO (AV-8)</p>	<p>Arms extended horizontally sideways beckoning upwards, with palms turned up.</p>	<p>Same as day signal with addition of wands.</p>	
<p>63</p>  <p>PASS CONTROL</p>	<p>With both arms shoulder height, point in direction of person receiving control.</p>	<p>Same as day except point amber wand.</p>	<p>Used by U.S. Navy personnel. Not a NATO signal.</p>
<p>64</p>  <p>COD RAMP: OPEN/CLOSE</p>	<p>One hand held in hold, the other finger and thumb extended but not touching; then bring fingers and thumb together several times. Pilot will respond with same signal.</p>	<p>Two wands used in same manner.</p>	<p>Ramps shall not come down until deck crew acknowledges pilot signal.</p>

ABHf0301p

Figure 3-1.—General aircraft handling signals (sheet 16; numbers 61 through 64).

SIGNAL	FROM	TO	EXECUTION
① EXTEND or LOWER STRUTS(S) 	Director	Pilot	<p>Day: Extend arms to one side, palms together and horizontal. Then, open arms.</p> <p>Night: Same except hold wands horizontally.</p> <p>Note: For lowering strut, reverse the procedure for extending strut.</p>
② LOWER LAUNCH BAR/ TOW LINK 	Director	Deck crew, Pilot	<p>Day: Rest right elbow in left palm at waist level. Bring right hand down to horizontal position.</p> <p>Night: Same except with wands.</p>
③ RAISE LAUNCH BAR/ TOW LINK 	Director	Deck crew, Pilot	<p>Day: Rest right elbow in left palm at waist level. With right forearm horizontal, bring right hand up to shoulder level.</p> <p>Night: Same as day except rest right elbow on wand.</p>
④ ATTACH BRIDLE/ PENDANT 	Launching officer	Director and Catapult crew	<p>Day: Extend arms forward at waist level; make slight lifting motion with forearm.</p> <p>Night: Hold both wands close to waist, extending forward horizontally; rotate wands from horizontal to vertical position.</p>

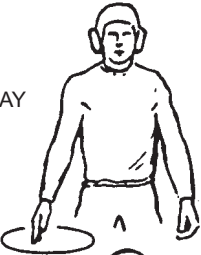
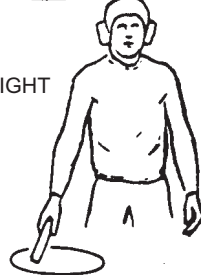


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Figure 3-2.—Launching signals (sheet 1; numbers 1 through 4).

SIGNAL	FROM	TO	EXECUTION
<p>5 TENSION AIRCRAFT ON CATAPULT</p>	Director	Catapult crew, Pilot	<p>Day: Extend arms overhead. Open clenched fists, palms forward to indicate pilot release brakes. Then sweep one hand across chest in direction of launch. Pilot will release brakes and apply appropriate power in accordance with aircraft NATOPS Manual.</p> <p>Night: Same using wands except indicate pilot release brakes by opening crossed wands above head.</p>
<p>6 UNTENSION AIRCRAFT ON CATAPULT</p>	Launching officer	Catapult crew, Pilot	<p>Day: Extend arms overhead, fists clenched to indicate pilot hold brakes. Then sweep one fist across chest and point in opposite direction of launch. Pilots will hold brakes.</p> <p>Night: Hold wands crossed overhead to indicate pilot hold brakes. Then sweep one wand across chest and point in opposite direction of launch. Pilot will hold brakes.</p>

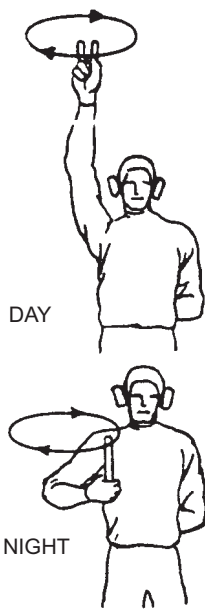
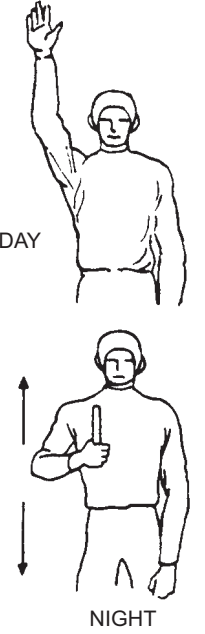
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Figure 3-2.—Launching signals (sheet 2; numbers 5 and 6).

SIGNAL	FROM	TO	EXECUTION
<p>⑦ TENSION BRIDLE ARRESTER LANYARD</p> <p>DAY</p>  <p>NIGHT</p> 	Hookup petty officer	Catapult crew	<p>Day: With hands down, make horizontal circular motion with one hand.</p> <p>Night: Same except use white stubby wand pointed down.</p>
<p>⑧ FIRST TURNUP</p> <p>DAY</p>  <p>NIGHT</p> 	Launching officer	Pilot	<p>Day: Extend arm overhead, forefinger pointing up. Hesitate, then rotate hand rapidly in a horizontal circle.</p> <p>Night: Hold RED and GREEN wands at chest level, rotating the green wand in a horizontal circle.</p> <p>Remarks: Signal is optional, given at request of pilot. Also can be used for deck launch.</p>

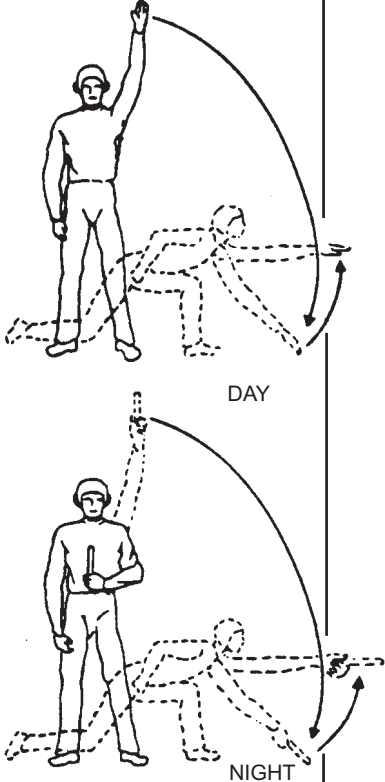
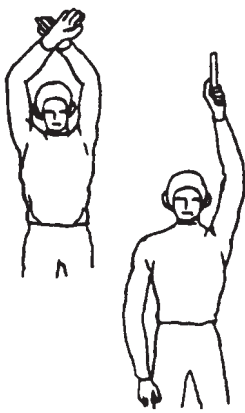
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Figure 3-2.—Launching signals (sheet 3; numbers 7 and 8).

SIGNAL	FROM	TO	EXECUTION
<p>⑨ FINAL TURNUP</p>  <p>DAY</p> <p>NIGHT</p>	Launching Officer	Pilot, Catapult crew	<p>DAY: Extend arm overhead, index and middle finger pointing up. Hesitate then rotate hand rapidly in a horizontal circle.</p> <p>Night: Rotate GREEN wand in a horizontal circle at chest level. Hold RED wand behind back.</p> <p>Remarks: The pilot will apply or maintain full power, check instruments, get set and:</p> <ol style="list-style-type: none"> 1. Day - turn head slightly toward Launching Officer, execute a hand salute, and position head against headrest. 2. Night - turn on only hsi running lights (STEADY), and keep them on until clear of ship.
<p>⑩ AFTERBURNER</p>  <p>DAY</p> <p>NIGHT</p>	Launching officer	Pilot	<p>DAY: Give "final turnup" signal (no. 9). Wait 2 or 3 seconds while pilot turns up to military rated thrust and checks instruments. Then, hold open hand toward pilot, fingers extended vertically.</p> <p>Night: Same except hold GREEN wand vertically and move up and down.</p> <p>Remarks: Pilot select afterburner, check instruments, and:</p> <ol style="list-style-type: none"> 1. Day - Salute when ready for launch. 2. Night - turn on only his running lights (STEADY), and keep them on until clear of ship.



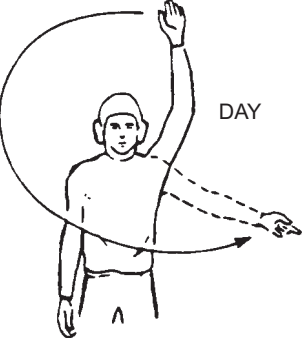
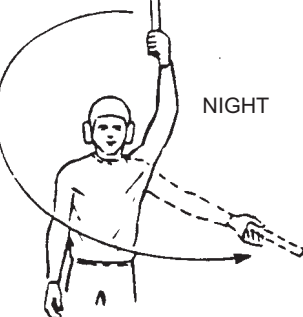
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Figure 3-2.—Launching signals (sheet 4; numbers 9 and 10).

SIGNAL	FROM	TO	EXECUTION
<p>⑪ FIRE/LAUNCH</p>  <p>DAY</p> <p>NIGHT</p>	Launching officer	Catapult crew, Pilot	<p>Day: Extend arm overhead. Ensure that pilot's head is against headrest and deck is clear forward. Sweep up-raised hand downward in the direction of launch, touching the deck and returning hand to the horizontal in the direction of launch.</p> <p>Night: Raise GREEN wand vertically overhead. Wait 2 or 3 seconds for pilot to position head against headrest. Ensure that deck is clear forward. Sweep wand in a wide arc, ending by pointing in the direction of launch, touching the deck and returning wand to the horizontal in the direction of launch.</p> <div style="border: 1px solid black; padding: 5px; text-align: center; margin: 10px 0;">WARNING</div> <p>The launching officer shall remain in the crouched position with his hand/wand held horizontally in the direction of launch until the aircraft has passed his position or a suspend/hangfire situation is indicated.</p> <p>Note - Also used for free deck launches.</p>
<p>⑫ SUSPEND</p>  <p>NIGHT</p>	Launching officer	Catapult crew, Pilot	<p>Day: Cross arms high overhead indicating the launch is off.</p> <p>Night: Hold RED wand high overhead indicating the launch is off. GREEN wand is turned off.</p> <p>Remarks: After this signal, pilot must remain ready for launch and not throttle back until after the "untension" and "throttle back" signals are given by the launching officer/catapult safety observer (ICCS).</p> <p>Note - Any flight deck or catapult personnel may signal a SUSPEND to the launching officers. The DAY signal is the same as the launchings officer's. The NIGHT signal is a horizontal movement of a wand or light.</p>

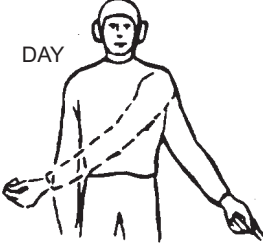
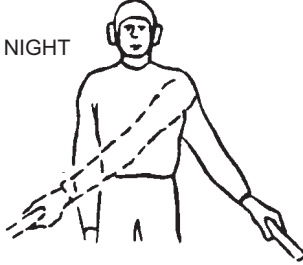
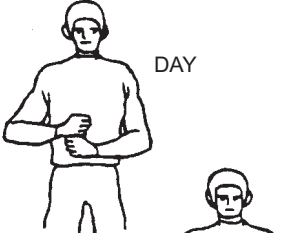
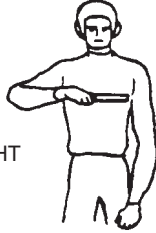
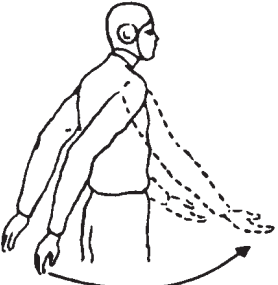
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Figure 3-2.—Launching signals (sheet 5; numbers 11 and 12).

SIGNAL	FROM	TO	EXECUTION
<p>⑬ HANGFIRE</p>  <p>DAY</p>  <p>NIGHT</p>	<p>Launching officer/ Catapult Safety Observer (ICCS)</p>	<p>Catapult crew, Pilot</p>	<p>Day: Give "suspend" signal (no. 12). Then point index finger of one hand at palm of other hand.</p> <p>Night: Give "suspend" signal (no. 12). Then hold RED wand overhead in a horizontal position. GREEN wand remains off.</p>
<p>⑭ UNTENSION AIRCRAFT ON CATAPULT (Following suspend or hangfire)</p>  <p>DAY</p>  <p>NIGHT</p>	<p>Launching officer</p> <p>Catapult Safety Observer (ICCS)</p>	<p>Catapult crew</p> <p>Launching officer (ICCS)</p>	<p>Day: With arms in "suspend" or "hangfire" position, sweep one hand from above head across chest and point in opposite direction to launch.</p> <p>Night: With RED wand in "suspend" or "hangfire" position, sweep it across chest and point in opposite direction of launch.</p>

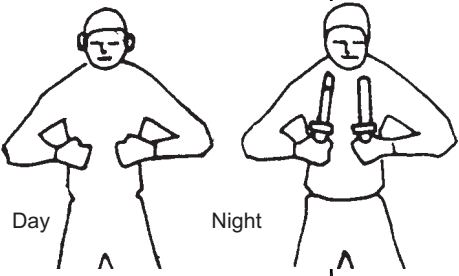
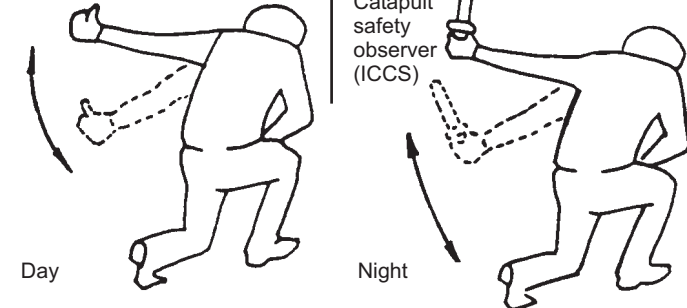
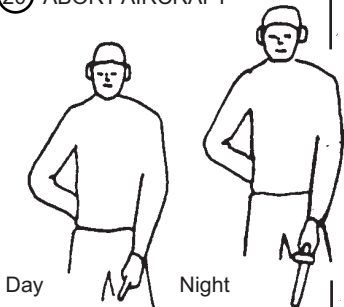
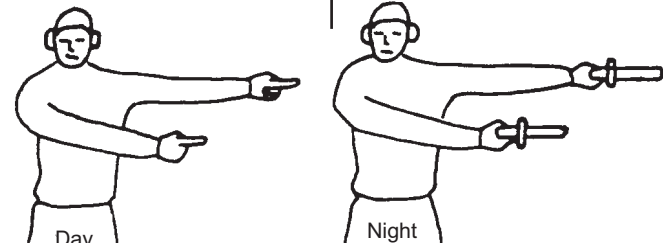
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Figure 3-2.—Launching signals (sheet 6; numbers 13 and 14).

SIGNAL	FROM	TO	EXECUTION
<p>⑮ SHUTTLE FORWARD</p> <p>DAY</p>  <p>NIGHT</p> 	<p>Launching officer/ Catapult crew</p> <p>Catapult safety observer (ICCS)</p>	<p>Catapult crew</p> <p>Launching officer (ICCS)</p>	<p>Day: Sweep one hand (pointed aft) in the forward direction.</p> <p>Night: Sweep RED wand (pointed aft) in the forward direction. GREEN wand is off.</p>
<p>⑯ THROTTLE BACK</p> <p>DAY</p>  <p>NIGHT</p> 	<p>Launching officer/ Catapult safety observer (ICCS)</p>	<p>Pilot</p>	<p>Day: Hold one fist at waist level, thumb extended up. Grasp thumb with other hand and rock as if adjusting throttle.</p> <p>Night: Hold RED wand horizontally across chest. Raise and lower horizontal wand. GREEN wand is off.</p>
<p>⑰ PUSH/PULL BACK</p> 	<p>Director</p>	<p>Deck crew</p>	<p>Day: Make fore-to-aft sweeping motion with arms extended downward, palms forward.</p> <p>Night: Same except with wands.</p>

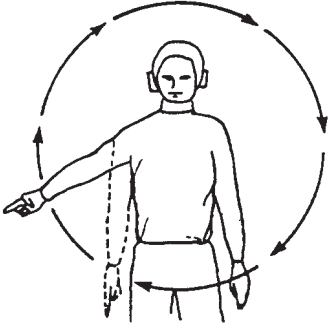
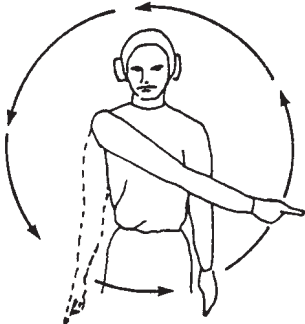
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Figure 3-2.—Launching signals (sheet 7; numbers 15 through 17).

SIGNAL	FROM	TO	EXECUTION
18 ACCEPT CONTROL  <p>Day Night</p>	Catapult officer	Director	<p>Day: Hold both hands with fists clenched in front at waist height.</p> <p>Night: Hold wands vertically in front of body. Turns wands on.</p>
19 GO  <p>Day Night</p>	Aircraft inspector/ Catapult safety observer (ICCS)	Catapult officer	<p>Day: Hold arm outstretched horizontally with fist clenched and thumb extended vertically. Move arm up and down.</p> <p>Night: Same as day signal except hookup petty officer uses white wand and catapult observer uses green wand.</p>
20 ABORT AIRCRAFT  <p>Day Night</p>	Catapult officer	Director	<p>Day: Hold right hand behind back and point down with forefinger of left hand.</p> <p>Night: Place green wand behind back and point down with red wand.</p>
21 PASS CONTROL  <p>Day Night</p>	Director	Catapult officer	<p>Day: With both arms at shoulder height, point in direction of person receiving control.</p> <p>Night: Same as day signal except point wands.</p>

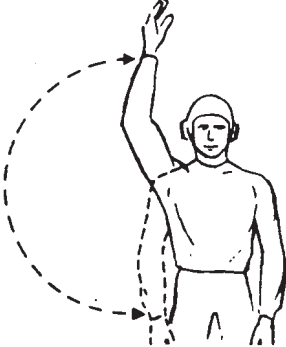
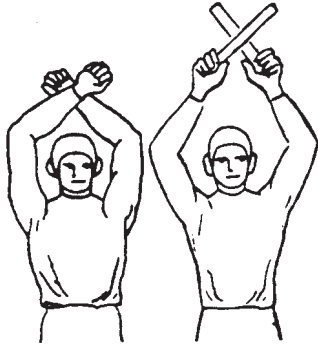

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Figure 3-2.—Launching signals (sheet 8; numbers 18 through 21).

SIGNAL	FROM	TO	EXECUTION
<p>(22)</p>  <p>RETRACT SHUTTLE</p>	Catapult officer	Deckedge officer	<p>Day: Finger pointing towards the bow at waist level. Sweep arm in a complete large circular motion. Stopping the sweeping motion with the finger pointed aft at waist level.</p> <p>Night: Same except use RED wand.</p> <p>Remarks: Deckedge Operator retract shuttle.</p>
<p>(23)</p>  <p>ADVANCE SHUTTLE</p>	Catapult officer	Deckedge officer	<p>Day: Finger pointing aft at waist level. Sweep arm in a complete large circular motion. Stopping the sweeping motion with the finger pointed towards the bow at waist level.</p> <p>Night: Same except use RED wand.</p> <p>Remarks: Deckedge Operator retract shuttle.</p>

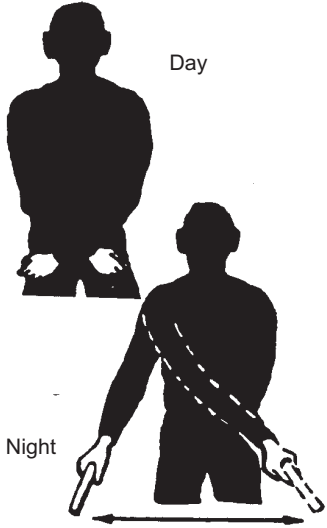

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Figure 3-2.—Launching signals (sheet 8; numbers 22 through 23).

SIGNAL	FROM	TO	EXECUTION
① CLEAR DECK 	Flight deck officer/ Director	Arresting gear officer	Day: Sweep arm from overhead position to side position and return. Night: Same as day except with AMBER wand.
② FOUL DECK 	Flight deck officer/ Director	Arresting gear officer	Day: Cross arms overhead, fists clenched. Night: Crossed AMBER wands held overhead
③ PULLBACK 	Hook runner Director	Director Pilot Deck-edge operator	Day: Make fore-to-aft sweeping motion with arms extended downward, palms aft. Night: Same motion except with RED stubby wand. Day: Make fore-to-aft sweeping motion with arms extended downward, palms forward. Night: Same motion except with two AMBER wands.

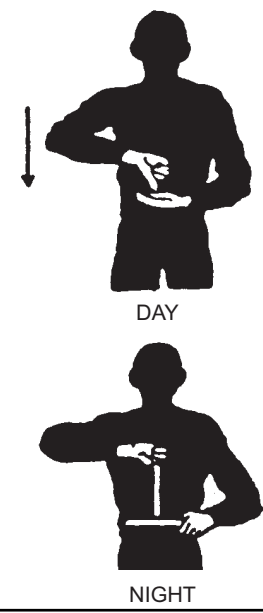
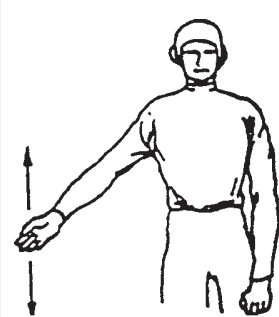
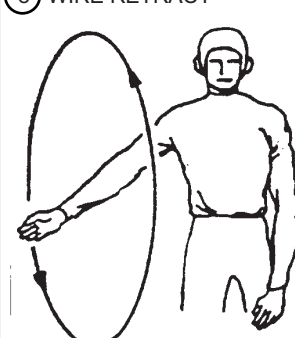
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Figure 3-3.—Landing signals (sheet 1; numbers 1 through 3).

SIGNAL	FROM	TO	EXECUTION
<p>④ CEASE PULL BACK</p> 	<p>Director</p> <p>Hook runner</p>	<p>Deck-edge operator</p> <p>Director</p>	<p>Day: Cross arms below waist.</p> <p>Night: Horizontal movements of wand below waist.</p>
<p>⑤ RAISE HOOK</p> 	<p>Director</p>	<p>Pilot</p>	<p>Day: Position left hand horizontally in front of body, palm down. Move right hand upward, bringing extended thumb into left palm.</p> <p>Night: Position left wand horizontally in front of body. Position right wand vertically to form a "T".</p>




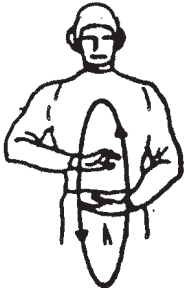
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Figure 3-3.—Landing signals (sheet 2; numbers 4 and 5).

SIGNAL	FROM	TO	EXECUTION
<p>⑥ LOWER HOOK</p>  <p>DAY</p> <p>NIGHT</p>	Director	Pilot	<p>Day: Position left hand horizontally in front of body, palm up. Move right hand downward, bringing extended thumb into left palm.</p> <p>Night: Position left hand horizontally in front of body. Position right hand vertically to form an inverted "T".</p>
<p>⑦ WIRE CLEAR</p> 	Hook runner	Director	<p>Day: Make vertical motion with arm pointed at the taxi director.</p> <p>Night: Same, holding RED stubby wand.</p>
<p>⑧ WIRE RETRACT</p> 	Hook runner	Deck-edge operator	<p>Day: Make large circular motion with arm extended to one side.</p> <p>Night: Same, holding RED stubby wand.</p>



ABHf0303c

Figure 3-3.—Landing signals (sheet 3; numbers 6 through 8).

SIGNAL	FROM	TO	EXECUTION
① TILLER BAR IN PLACE OR ENGAGE NOSE-WHEEL STEERING 	Director	Pilot	Day: Touch end of nose with forefinger. Then, give thumbs up signal with same hand. Night: Touch end of nose with wand. Then give "up" signal with same wand.
② TILLER BAR REMOVED OR DISENGAGE NOSE-WHEEL STEERING 	Director	Pilot	Day: Touch end of nose with forefinger. Then, sweep arm downward in direction of aircraft movement.. Night: Touch end of nose with wand. Then sweep wand downward in direction of aircraft movement.
③ WING RIDER 	Director	Deck crew, Pilot	Day: Position forearms flat against each other in front of and perpendicular to body. Night: Same, holding wands.
④ INSTALL TIE-DOWNS 	Director	Pilot, Brake rider	Day: Rotate hands in a vertical circle in front of body Night: Same as day except with AMBER wands.



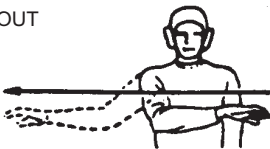
































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Figure 3-4.—Flight deck aircraft handling signals (sheet 1; numbers 1 through 4).

SIGNAL	FROM	TO	EXECUTION
<p>⑤ TIE-DOWNS IN PLACE</p> 	Director	Pilot Brake rider	Same as "install tie-downs," adding a thumbs up signal.
<p>⑥ REVERSE THRUST TAXI</p> 	Director	Pilot	<p>Day: Palms facing aircraft at eye level with a push back motion. For turns, the director points in direction tail is to move.</p> <p>Night: Same, holding wands.</p>

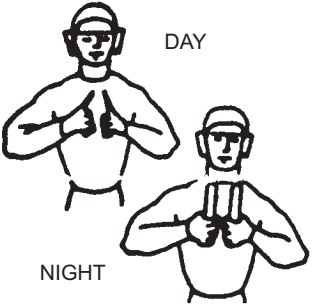
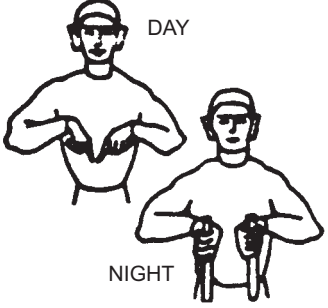
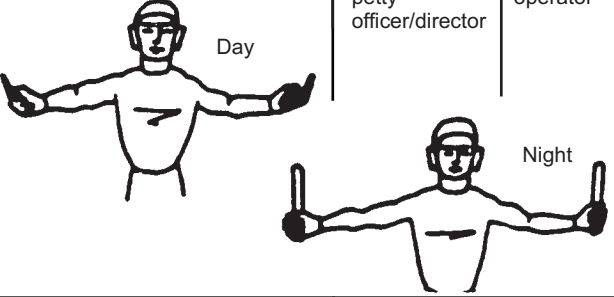
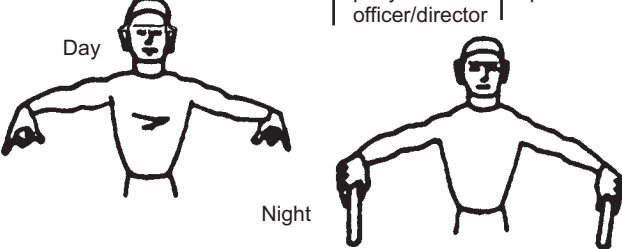
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Figure 3-4.—Flight deck aircraft handling signals (sheet 2; numbers 5 and 6).

REFUELING SIGNALS		
1. OFF  Pat top of head	2. FUEL STATUS  Movement of thumb to mouth for requesting fuel on board.	3. PROBE OUT  Arm across chest, then extend out horizontally.
4. PROBE IN  Arm extended out horizontally, then brought in to cross chest.	5. CLOSE DUMP VALVE  Point finger at elbow	6. CUT FUEL  Fingers point at throat, moving hand sideways.
FUEL QUANTITY SIGNALS*		
7. FOR HUNDREDS OF POUNDS <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  Clenched fist </div> <div style="text-align: center;">  100 </div> <div style="text-align: center;">  200 </div> <div style="text-align: center;">  300 </div> <div style="text-align: center;">  400 </div> <div style="text-align: center;">  500 </div> <div style="text-align: center;">  600 </div> <div style="text-align: center;">  700 </div> <div style="text-align: center;">  800 </div> <div style="text-align: center;">  900 </div> </div>		
8. FOR EVEN THOUSANDS OF POUNDS <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;">  1,000 </div> <div style="text-align: center;">  2,000 </div> <div style="text-align: center;">  3,000 </div> <div style="text-align: center;">  4,000 </div> <div style="text-align: center;">  5,000 </div> <div style="text-align: center;">  6,000 </div> <div style="text-align: center;">  7,000 </div> <div style="text-align: center;">  8,000 </div> <div style="text-align: center;">  9,000 </div> </div>		
9. FOR LOADS THAT DO NOT FALL ON EVEN THOUSANDS OF POUNDS <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <p>Example: 1,500 lbs</p> <div style="display: flex; align-items: center;"> <div style="text-align: center;">  1,000 lbs </div> <div style="text-align: center;"> <p>followed by 500 lbs</p>  </div> </div> </div> <div style="text-align: center;"> <p>Example: 7,400 lbs</p> <div style="display: flex; align-items: center;"> <div style="text-align: center;">  7,000 lbs </div> <div style="text-align: center;"> <p>followed by 400 lbs</p>  </div> </div> </div> </div> <p style="text-align: center;">Double finger (a vertical signal followed by a horizontal one)</p>		
10. FOR LOADS OF TEN THOUSANDS OF POUNDS AND OVER <div style="display: flex; justify-content: space-around; align-items: flex-end;"> <div style="text-align: center;"> <p>Example: 12,000 lbs</p> <div style="display: flex; align-items: center;"> <div style="text-align: center;">  10,000 lbs </div> <div style="text-align: center;"> <p>followed by 2,000 lbs</p>  </div> <div style="text-align: center;"> <p>followed by clenched fist</p>  </div> </div> </div> <div style="text-align: center;"> <p>Example: 12,500 lbs</p> <div style="display: flex; align-items: center;"> <div style="text-align: center;">  10,000 lbs </div> <div style="text-align: center;"> <p>followed by 2,000 lbs</p>  </div> <div style="text-align: center;"> <p>followed by 500 lbs</p>  </div> </div> </div> </div> <p style="text-align: center;">Double finger (a vertical signal followed by a horizontal one) followed by a clenched fist for exact thousands, or a third finger signal for hundreds</p>		

ABHf0305

Figure 3-5.—Refueling hand signals (numbers 1 through 10).

SIGNAL	FROM	TO	EXECUTION
① RAISE SAFETY STANCHION 	Elevator safety petty officer/director	Elevator operator	Day: Raise both index fingers extended upward chest level, in close together, near body. Night: Raise both wands pointed upward at shoulder level, close together, and near body.
② LOWER SAFETY STANCHION 	Elevator safety petty officer/director	Elevator operator	Day: Lower both index fingers, extended downward, chest level, close together, and near body. Night: Lower both wands pointed downward at waist level, in close together, and near body.
③ RAISE ELEVATOR 	Elevator safety petty officer/director	Elevator operator	Day: Fully extend both arms with index finger pointing upward. Night: Fully extend both arms with wands pointing upward.
④ LOWER ELEVATOR 	Elevator safety petty officer/director	Elevator operator	Day: Fully extend both arms with index finger pointing downward. Night: Fully extend both arms with wands pointing downward.

ABHf0306

Figure 3-6.—Aircraft elevator signals (numbers 1 through 4).

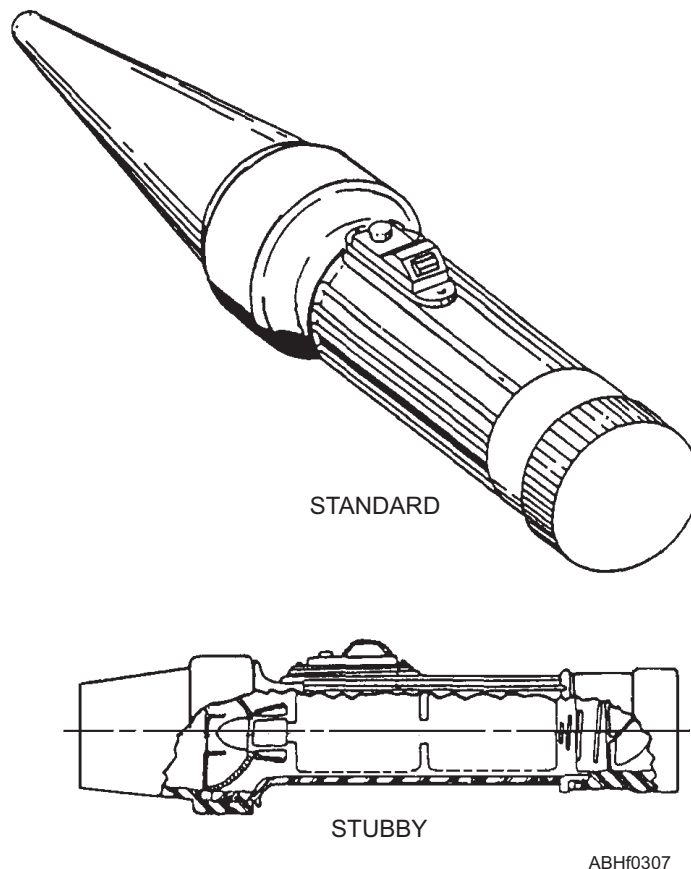


Figure 3-7.—Signal wand.

quarters. The plane director should execute this signal by alternately giving the standard **COME AHEAD** signal (with slow movement of the arms), followed by the **SLOW DOWN** signal, followed by the **STOP** signal, as necessary.

- Q1. What NAVAIR manual provides in-depth information on aircraft signals?
- Q2. Which aircraft handling signals are NATO approved?

SIGNAL WANDS

OBJECTIVE: Identify the correct application of signal wands.

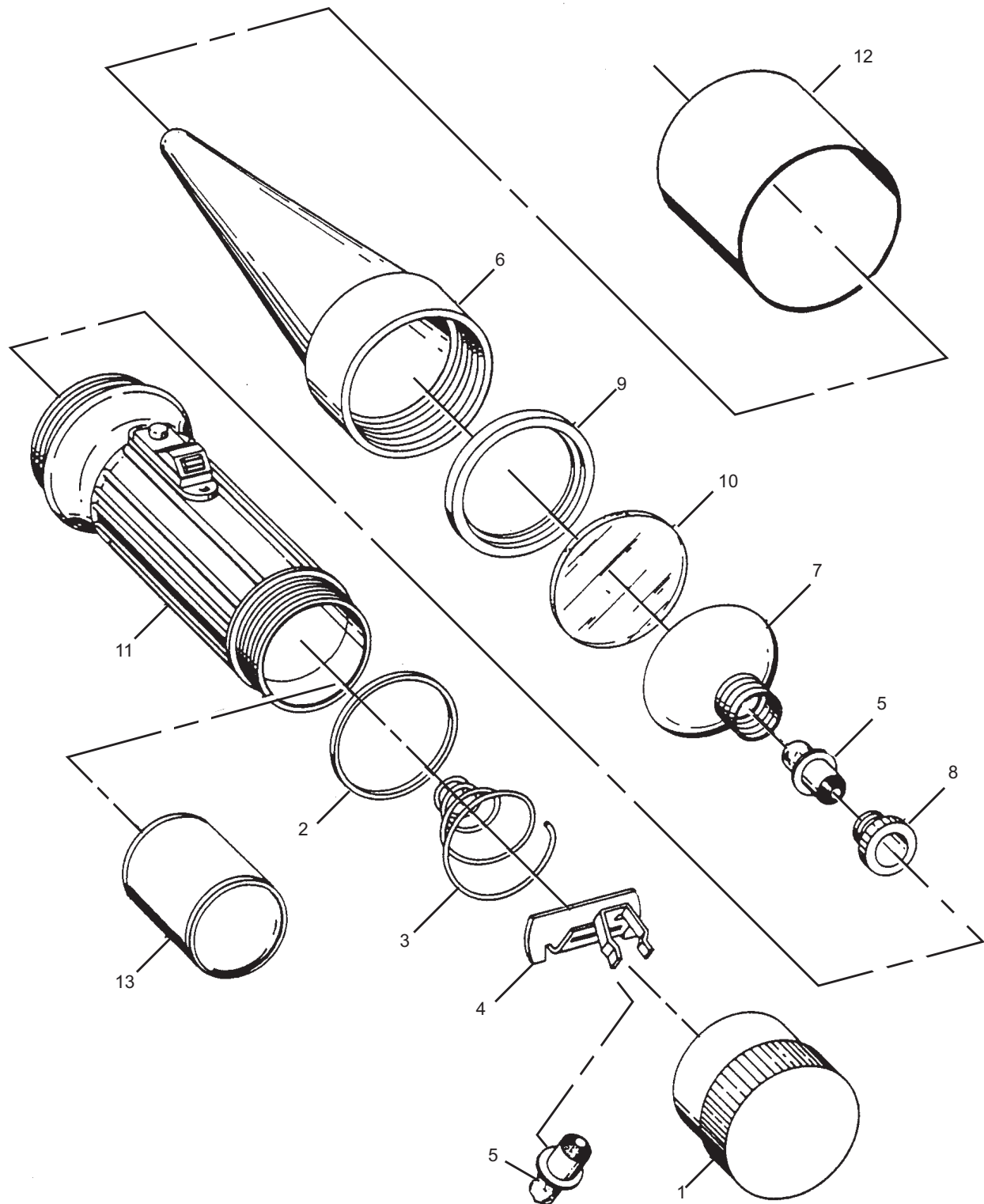
During night operations, signal wands perform an important role in aircraft handling safety on the flight deck. Inappropriate use of signal wands on the flight deck will cause confusion and lead the way for a mishap. Standard signal wands (see figure 3-7) are used by a wide variety of personnel during night flight operations, and it is important that only those signal wands prescribed in table 3-1 be used.

To give visual direction to pilots and other deck personnel during night operations, the aircraft director will use two signal wands with amber colored filters. A signal wand comes with additional interchangeable colored filters (white, red, amber, green, and blue) for use by other deck personnel. A conical shaped diffuser screwed on the flashlight forms the lighted portion of the wand. A push button or slide switch provides momentary or continuous light control. Refer to figure 3-7 for the overall view.

Two signal wands are used by aircraft handling personnel to give visual direction to the aircraft pilot and other deck personnel during night operations. The wands are of different colors and/or shapes for the personnel designated to use them. The different colors and/or shapes of the cones on the wands are a safety factor. This is to prevent the pilots or other personnel working in or around where night flight operations are being conducted from misinterpreting a signal, which could cause damage to the aircraft or equipment or serious injury or death to personnel. Table 3-1 lists the personnel authorized to use wands during night operations, color of the wand(s), numbers of wands used, and type or shape.

Table 3-1.—Standard Signal Wands

PERSONNEL	COLOR	NO	TYPE*
Aviation Fuels Checker/Repairman	Amber	1	Stubby
Bow Safety	Red	1	Standard
	Green	1	Standard
Catapult Hookup Petty Officer	White	1	Stubby
Catapult Safety Observer (ICCS)	Red	1	Standard
	Green	1	Standard
Center Deck Operator (Topside)	White	1	Stubby
Deck Edge (Arresting Gear)	Red	1	Standard
	Green	1	Stubby
Deck Edge (Catapults)	Red	1	Standard
	Green	1	Standard
Flight Deck Officer and Aircraft Directors	Amber	2	Standard
Hook Runner	Red	1	Stubby
JBD Safety	White	1	Stubby
Launching and Arresting Gear Officer/Helicopter LSE/LSO	Red	1	Standard
	Green	1	Standard
LSO Platform Talker (Arresting Gear)	Red	1	Standard
	Green	1	Standard
Ordnance Arming Crew	Red	1	Stubby Banded**
Ordnance Arming/Safety Supervisor	Red	2	Standard Banded***
Plane Captain	Blue	2	Standard
Squadron Aircraft Inspector	Blue	1	Stubby
<p>* Standard and stubby denote cone shape. Standard denotes full length cones; stubby is a modified cone providing 3 inches of lighted cone. Any suitable battery and switch housing is authorized if cone is brightly lighted. All signal wands/flashlights shall be equipped with heat-shrinkable sleeving to prevent possible cone separation.</p>			
<p>** One 3/4-inch band on the cone (plastic electricians tape is recommended).</p>			
<p>***Two 3/4-inch bands spaced equidistant on the cone (plastic electricians tape is recommended).</p>			



ABHf0308

- | | |
|-----------------------|---|
| 1. Cap | 8. Insert |
| 2. Gasket | 9. Gasket |
| 3. Spring | 10. Red filter, green filter, yellow filter |
| 4. Spring retainer | 11. Case assembly |
| 5. Bulb | 12. Heat shrinkable sleeving, 21.D. (81349) |
| 6. Diffuser | 13. C size batteries |
| 7. Reflector assembly | |

Figure 3-8.—Wand assembly (408117-2).

Wands are used at night in the same manner as the hands are used in day signaling. Night signals that differ from day signals are shown in figures 3-1 through 3-6.

WAND MAINTENANCE

Maintenance of the signal wand generally consists of replacing the batteries and the bulb. Maintenance on the wands should be done well before the wands are required on deck. Don't wait until it is almost dark before checking on the signal wands. Refer to figure 3-8 for the exploded view of the wand. A spare bulb is provided on a spring retainer in the cap.

The exploded view shows each component of the wand. The component parts are listed in the order of disassembly.

- Q3. *What is the color and type of signal wand used by a plane captain?*
- Q4. *What personnel on the flight deck have red wands with two 3/4" bands on the cone?*

AIRCRAFT HANDLING PROCEDURES

OBJECTIVES: Identify the responsibilities of an aircraft director. Recognize aircraft handling safety procedures. Identify catapult nose gear launch procedures.

Aircraft handling is a general term that describes any movement of aircraft or associated equipment aboard a CV/CVN. All aircraft handling on the flight and hangar decks is controlled by the Aircraft Handling Officer (ACHO). The ACHO briefs the flight/hangar deck supervisory personnel before each evolution of planned aircraft movements. They, in turn, brief their crews. The crews are responsible, through their designated supervisors, for the safe and efficient accomplishment of each evolution. Table 3-2 outlines the flight quarters clothing requirements for aircraft handling crews as well as the other personnel associated with flight operations onboard an aircraft carrier.

Only designated and qualified aircraft directors may control the movement of an aircraft. Aircraft handling personnel are required to report to higher authority any observed unsafe practices or any conditions that may affect the safety of personnel or equipment. For detailed information on aircraft handling procedures and safety precautions, you should refer to the *CV NATOPS Manual*, NAVAIR 00-80T-105, and the *Air Department Standard*

Operating Procedures (SOP), COMNAVAIRPAC/COMNAVAIRLANTINST 3100.4.

MOVEMENT OF AIRCRAFT

The flight deck of an aircraft carrier is one of the busiest places in the Navy. Understanding the relationships and responsibilities of personnel who work on the flight deck will greatly increase the efficiency of handling aircraft. The most effective, efficient and successful air department's understand and practice the concept of teamwork and function together as a unit. The following text identifies some of the responsibilities of personnel assigned to work on the flight deck when moving aircraft.

A plane captain's (PC) paramount duty is to be with his aircraft at all times during Flight Quarters and other times as may be ordered. A qualified PC or brake rider shall be in the cockpit manning the brakes any time the aircraft is moved without a pilot. The PC shall ensure that the brakes are functioning properly and is positioned in such a manner to properly apply the brakes. The PC shall ensure that the cockpit is open, weather permitting, so that the director's whistle can be heard. The PC shall know all visual and oral signals used in aircraft handling and be alert to respond to them instantly. The PC is responsible for wearing proper flight deck gear as outlined in the CV NATOPS.

When a pilot is to man the aircraft, the plane captains will assist the pilot with cockpit strapping procedures. When completed, the plane captain will stand by the nose of the aircraft ready to start engines. This command shall be given by the Air Officer and at that time, and not before, the plane captain will signal the tractor driver, and pilot to start engines. Engines will not be started unless personnel are clear of intakes, tailpipes, propellers, etc.

Plane captains and chockwalkers will be responsible for removing tiedown chains when signaled by the director. Removing the chocks is a chockwalker responsibility. After the aircraft is ready to taxi out of its spot, the PC will proceed, with the required tiedowns, jury struts, etc., to a designated area and remain there until the aircraft has been launched. The PC should be prepared to return immediately to the aircraft should it not launch for any reason.

When an aircraft lands and is spotted forward, the PC shall meet the aircraft immediately and insert down locks/gear pins and/or jury struts, as required. The PC shall ensure that the aircraft has initial tiedowns installed before the pilot(s) exit(s) the aircraft.

Table 3-2.—Authorized Flight Quarters Clothing

PERSONNEL	HELMET	JERSEY/ FLOATATION VEST	SYMBOLS, FRONT AND BACK
Aircraft handling crew and chock men	Blue	Blue	Crew number
Aircraft handling officers and plane directors	Yellow (Note 1-5 as needed)	Yellow	Billet title — crew number
Arresting gear crew	Green	Green	A
Aviation fuel crew	Purple	Purple	F
Cargo handling personnel	White	Green	"Supply"/"POSTAL" as appropriate
Catapult and arresting gear officers	Green	Yellow	Billet title
Catapult crew	Green	Green	C
Catapult/AG QA	Green	White	ALRE QA
Catapult safety observer (ICCS)	Green	(Note 6)	Billet title
Crash and salvage crews	Red	Red	Crash/Salvage
Elevator operators	White	Blue	E
Explosive ordnance disposal	Red	Red	"EOD" in black
GSE troubleshooter	Green	Green	"GSE"
Helicopter LSE	Red	Green	H
Helicopter plane captain	Red	Brown	H
Hook runner	Green	Green	A
JBD safety observer	Green	Green/White	JBD safety
Landing signal officer	None	White	LSO
Leading petty officers:			
Line	Green	Brown	Squadron designator and "Line CPO"
Maintenance	Green	Green	Squadron designator plus "Maint. CPO"
Quality assurance	Brown	White	Squadron designator and "QA"
Squadron plane inspector	Green	White	Black and white checkerboard pattern and squadron designator
LOX crew	White	White	LOX
Maintenance crews	Green	Green	Black stripe and squadron designator
Medical	White	White	Red Cross
Ordnance	Red	Red	3-inch black stripe and squadron designator/ship's billet title
Ordnance QA	White	(Note 8)	Squadron designator and "ORDNANCE QA/SAFETY"
Photographers	Green	Green	P
Plane captains	Brown	Brown	Squadron designator
Safety	White	White	"SAFETY"
Supply VERTREP coordinator	White	Green	"SUPPLY COORDINATOR"
Tractor driver	Blue	Blue	Tractor
Tractor King	Blue	(Note 7)	TK
Transfer officer	White	White	"TRANSFER OFFICER"

Table 3-2.—Authorized Flight Quarters Clothing—Continued

Note

1. Only personnel charged with the actual control or direction of aircraft movements on the flight or hangar decks shall wear yellow jerseys. Personnel in charge of a detail, such as aviation fuels, ordnance, and maintenance, shall wear a helmet and jersey corresponding in color to that of their respective detail and with their billet title on the jersey and flotation vest.
2. Helmets for all personnel shall be marked with a 6-inch square (or equivalent) of white reflective tape on the back shell and a 3-inch by 6-inch (or equivalent) of white reflective tape on the front shell. Landing signal officers are not required to wear helmets or sound attenuators when engaged in aircraft control. Helmets shall have a 2-inch piece of velcro on the left side of the front shell and velcro on the survival light.
3. Three reflective international orange stripes, 1-inch wide, evenly spaced, running fore and aft on top of the white reflective tape.
 - a. All air department officers
 - b. Air department chief petty officers and leading petty officers
 - c. EOD team members
 - d. All ordnance officers and gunners
 - e. Ordnance handling officer and gunner.
4. Helmets for all personnel who have not completed flight deck observer qualification shall be marked (front and rear) with a "T" using 1-inch wide blue reflective tape over the existing reflective tape (front minimum 2-inch tall, rear minimum 3-inch tall lettering).
5. Helmets for all aircraft directors under instruction shall be marked (front and rear) with a "U/I" using 1-inch wide blue reflective tape evenly spaced over the existing reflective tape (front minimum 2-inch tall, rear minimum 3-inch tall lettering).
6. New requirement for ICSS is green jersey and yellow vest.
7. Yellow jersey/blue flotation vest.
8. White jersey/red flotation vest.

Plane captains will assist fueling crews during all fueling operations of their aircraft. The PC shall check primary and secondary shutoff valves. Aircraft shall be fueled per the flight plan. Any change must have approval of the Air Operations Officer. Fuel spilled on the deck due to fuel venting or failure to close dump valves is the cleaning responsibility of the plane captain.

An aircraft director is charged with the safe and effective handling of aircraft. Whether towing or taxiing, inport or underway, flight deck or hangar bay, the responsibility for safety of the move crew and the aircraft rest with the aircraft director. Sound judgement, experience, skill, and adherence to established procedures will positively affect successful aircraft handling. An aircraft director should make sure of the following:

(1). The cockpit is manned by a qualified brake rider who has checked the aircraft braking system to ensure adequate pressure for safe movement. The director must also visually verify aircraft brake pressure, when applicable.

(2). Before having the chocks and tiedowns removed, the director shall call for "brakes" and receive visual or verbal confirmation from the person in the cockpit that the brakes are being held.

NOTE

When an aircraft with inoperative brakes must be respotted, the cockpit will not be manned and chockwalkers will remain in position to chock the main wheels instantly if ordered. Movement of no-brake aircraft must be with the approval of the ACHO.

(3). All personnel except those necessary for the move are well clear of the aircraft, and those personnel necessary for the move are properly positioned.

(4). Adequate clearance exists to permit safe movement.

(5). All chocks, tiedowns, power cables and other servicing/securing devices are removed prior to moving the aircraft. Tiedowns shall not be "hung" from the aircraft.

(6). If weapons loading/downloading is in progress, assurance is received from the ordnance crew leader that the aircraft is safe to move insofar as weapons are concerned.

(7). Directors and aircraft handling team shall be equipped with whistles which they will hold in their mouths while controlling aircraft movement. The whistles and hand signals will be used to signal for brakes and chocks.

(8). The controlling director shall ensure that they are plainly visible to the brake rider.

(9). Safety observers shall be stationed as necessary to ensure safe clearance any time an aircraft will pass in close proximity (five feet or less) to another aircraft, bulkhead or other obstruction. Anyone properly equipped with a whistle and familiar with deck signals and procedures may act as a safety observer. The safety observer and the director in control of the aircraft must either have each other in sight at all times or have a second safety observer stationed in position to relay signals. At least one safety observer is required for each aircraft movement on the hangar deck.

(10). Item (9) above shall not be construed to require any individual to place their personal safety in jeopardy. This is particularly applicable at night or during periods of heavy weather.

(11). During periods of high winds or when the deck is unsteady, chockwalkers shall closely tend each main wheel. Brake riders shall apply partial brakes as necessary to prevent excess speed from building up. Caution should be exercised to ensure brake pressure remains built up during the move. When these conditions prevail, aircraft shall not be moved by hand except in cases of extreme urgency.

(12). When the word is passed to stand by for a turn, exercise extreme caution in moving aircraft.

(13). Tractor drivers shall not move an aircraft except under the positive control of a director. If a director's signal is not completely understood, the driver shall stop and await further instructions.

(14). Sudden stops by tractors towing aircraft must be avoided except in an emergency.

(15). Personnel shall not ride on tractors except in the driver's seat.

(16). Movement shall be slow enough to permit a safe stop to be made within the clear space available, and in no case faster than the chockwalkers can walk.

(17). An aircraft's tailwheel shall be unlocked only on a signal from the director.

(18). When an aircraft towbar has to be repositioned to permit a better path of movement prior to aircraft reaching interim or final spot, the aircraft shall be chocked and initial tiedowns installed prior to disconnecting the towbar.

(19). As an aircraft nears its parking spot, it should be slowed to a speed that will permit an immediate stop. Directors and safety observers are responsible for maintaining safe clearance for the tractor when maneuvering in close quarters, since the tractor driver must watch the director and is often unable to check the clearance for himself.

(20). Prior to backing aircraft to deck edge spots, chockwalkers shall be positioned so as to enable them to chock the main wheels instantly.

WARNING

Proper position to walk chocks is abreast the main wheel with adjustable block towards the aft end of the aircraft. At no time will the chock walker place himself

in the direction of the aircraft wheel's travel, either forward or aft of the mainmount. The chock shall be walked on the opposite side of the brake/strut assembly. It shall be installed on the side opposite the brake/strut assembly to avoid the chock becoming jammed under the aircraft during fueling or in case of a flat tire. At no time will chockwalker carry tiedown chains while walking chocks.

(21). When the signal for brakes is given, the pilot/brake rider in the cockpit shall immediately apply full brakes. Care must be exercised to apply brakes simultaneously, particularly when the aircraft is being moved by hand. The brake signal is a sharp blast on the whistle, accompanied by the standard visual signal.

(22). The main wheels will be chocked as soon as the aircraft stops, and the director will remain with the aircraft until the handling crew has completed the initial tiedowns. The tractor will then be unhitched and the brake rider notified by the director that he could leave the cockpit. The plane captain will thereupon inspect attached tiedowns for proper installation and ensure intermediate tiedown security.

(23). When maintenance evolutions on the hangar deck require the tails or other parts of aircraft to protrude through or otherwise foul aircraft elevator door openings, a fully PQS qualified elevator door operator shall be assigned and remain in the immediate vicinity of the elevator door control panel. The door operator will remain stationed until the aircraft maintenance has been completed and the aircraft has been respothed clear of the elevator doors' path of travel. Aircraft maintenance conducted in these areas shall never be such that it will preclude movement to clear elevator doors in an emergency.

(24). When parking aircraft on the hangar deck, allow clearance for access to, and operation of, lightwater and salt water stations, as well as for the operation of hangar bay doors.

(25). Reverse tow of properly configured aircraft is authorized when using locally established procedures.

CAUTION

Special precautions are required when aircraft are parked over elevator/barricade stanchions, JBD's, elevators, catapult tracks, or with tail skag outboard of the deck edge. When aircraft are spotted adjacent to an elevator, tiedowns shall not be attached to the elevator. Tiedowns shall never be attached to catapult tracks, holdback fitting cleats, or bridle arrestor tracks.

ELEVATOR OPERATION

Operating an aircraft elevator for the purpose of aircraft movement must be a planned, well executed evolution by both flight deck and hangar deck handling crews. Inaccurate spotting of an aircraft by either crew or sloppy handling procedures can lead to disastrous results.

Elevator operation must be coordinated with the maneuvering of the ship. Only qualified and designated personnel must operate an aircraft elevator. A director/elevator safety petty officer must supervise operation of the elevator any time it is being raised or lowered. He or she must be plainly visible to the elevator operator at all times. When operating an elevator, the director must verify that any aircraft on the platform are properly secured and configured for the elevator movement.

CAUTION

If weapons loading/downloading is in progress, the director must receive assurance from the ordnance crew leader that it is safe to move the elevator insofar as weapons are concerned.

When the word is passed to standby for a turn, deck edge elevators on the side opposite the direction of turn, if not already at flight deck level, must be raised as soon as feasible.

Any delays must be reported immediately to the bridge. When aircraft are being parked on deck edge elevators, the ACHO must consider the sea state and wind velocity in determining the degree of security required.

WARNING

Extreme caution must be exercised when operating deck edge aircraft elevators during high winds and/or heavy seas.

When sending aircraft to the hangar deck, flight deck directors should position the aircraft on the elevator so that it can be towed directly into the hangar bay without repositioning.

Elevators and stanchions should not be operated in the automatic mode. Guardrail (stanchion) and elevator operations are two distinctly separate functions that require coordination. Before signaling the elevator to be raised or lowered, the director must check the stanchion for clearance, then signal for it to be raised or

lowered. If obstructions prevent raising of stanchions to full height, the positions desired will be indicated before commencement of the evolution. The elevator operator will then sound the warning horn, check to ensure that all personnel are clear, and raise the stanchion. As soon as the stanchions are up, and after ensuring locks are retracted, the director will signal for the elevator to be raised or lowered. If the stanchions are inoperative, safety observers must be stationed near the elevator to warn approaching personnel, and a temporary safety line will be rigged as quickly as possible. The warning horn must be sounded three times before elevator movement, and continuously throughout the elevator cycle. On low-speed operations, warning horns will sound a 5 to 10 second blast every 20 to 30 seconds. After the stanchions have been raised or the warning given, no person is to board or leave the elevator.

WARNING

- Extreme caution is necessary when operating aircraft elevators when stanchions are inoperative.
- Elevators must NOT be operated without two-way communication, either verbal or visual, between operators.

Elevators will remain at hangar deck level for as short a time as possible. An elevator carrying an aircraft to the hangar deck must NOT be lowered until it has been determined that a crew is standing by to remove the aircraft from the elevator as soon as it arrives at hangar deck level.

Except during launch and recovery, when full flight deck gear must be worn, all personnel who ride an elevator between the flight deck and hangar deck when the ship is underway must wear flotation gear.

REPORT OF DAMAGE TO AIRCRAFT

Any damage to an aircraft, no matter how slight, must be immediately reported to the safety officers, ACHO, flight deck officer, or hangar deck officer, who will immediately report the incident to the air officer and inform the air wing maintenance liaison representative. The aircraft must NOT be flown until it has been inspected and declared to be in an "Up" status by authorized squadron personnel.

The flight deck officer and hangar deck officer maintain a record showing director's name, model aircraft, bureau number, and a brief summary of the aircraft damaged, regardless of the extent of damage.

Reports of these occurrences must be made according to OPNAVINST 3750.6 and COMNAVAIRPAC/COMNAVAIRLANTINST 3100.4.

TAXIING OF AIRCRAFT

CAUTION

You should never attempt to give signals to an aircraft that is not under your command.

In operations requiring taxiing of aircraft, directors are stationed at intervals of 50 to 100 feet along the flight deck. The director must be in a position to give the pilot an unobstructed view of the signals. The visual stance of an experienced director ready to take over control of an aircraft is with one arm high overhead and palm forward. (See figure 3-1, signal No. 52.) This not only aids the pilot in recognizing the director but also puts the director in a position to render practically any taxi signal with a minimum of movement. The director retains control of the aircraft only while it is in their area of control. The director then passes control to the next director in line on the deck by means of the turnover-of-command signal. See signal No. 3 of figure 3-1.

For more information on aircraft signals, you should refer to the *Aircraft Signals NATOPS Manual*, NAVAIR 00-80T-113, or the *CV NATOPS Manual*, NAVAIR 00-80T-105.

DIRECTING TAXIING AIRCRAFT

During flight operations, the speed with which aircraft can be launched or landed depends largely upon the efficiency of the plane directors. Aircraft must often be moved expeditiously, often within inches of the edge deck and within inches of other aircraft. Mistakes by directors under these conditions usually prove costly.

When launching, aircraft must be moved out of the spotting area and spotted on a catapult or in the takeoff spot. When an aircraft lands, it must be released from the arresting gear, moved forward, and spotted to make room for the next aircraft to land. Since time is an essential factor in these operations, aircraft are generally taxied to the desired location. Plane directors are charged with the responsibility of directing these taxiing aircraft to their proper spots.

Three of the most important rules for you to remember in directing taxiing aircraft are as follows:

1. Make sure the pilot can see the signals. The standard position for the director is slightly ahead of the

aircraft and in line with the left wing tip. On carriers, it is often necessary to direct aircraft from other positions. A foolproof test of whether or not signals are visible to the pilot is "if you can see the pilot's eyes, the pilot can see your signals."

2. The person being signaled must understand the signals, know them thoroughly, and use them in a precise manner. Indistinct signals or confused execution of signals will lead to casualties. Do not walk while taxiing an aircraft.

3. When jet aircraft are taxied, extreme caution should be used to prevent personnel from being caught in the jet blast exhaust and being severely burned or blown overboard. Other aircraft and/or support equipment could suffer a similar fate.

SPOTTING AIRCRAFT

All carriers have a basic spotting order. The aircraft are spotted for launching in approximately the same location each time. This spotting order varies from carrier to carrier to suit the flight deck layout. Certain aircraft must be spotted in a specific location to permit servicing, loading of ammunition, starting, maintenance, and so forth. The spotting of large aircraft should be such that the aircraft does not interfere with the movement of other aircraft or where they do not need to be moved during launching or recovery operations.

Before each launching operation, a briefing is held by the ACHO. All flight deck directors and spotters attend this briefing. During the brief, specific launch procedures and sequences are given. The disposition of aircraft that go down during the launch is determined, and directors and spotters are informed as to their specific part of the operation. Once the brief is completed, the Fly Petty Officers (Fly PO's) inform their crew of the launch details. When briefing for the first launch of the day, details of the recovery are also included. As soon as the last aircraft has left the deck, the previous launch must be recovered. The crews must also be aware that the need for a ready deck may arise at any time because of an emergency situation. While actual operational procedures will vary from ship to ship, the Fly PO typically is responsible for correctly spotting each aircraft within their respective Fly.

LAUNCHING AIRCRAFT

Using the flight schedule, the aircraft status board, and advice from the air group maintenance officer as to what aircraft may be ready, the ACHO assigns the

aircraft by side number to the scheduled launch. After making the decision as to which aircraft to use, the ACHO, using the Ouija (wee-gee) board, determines the best location for the GO aircraft.

A typical aircraft carrier launch spot has aircraft spotted along the deck edge, island structure, on aircraft elevators, and in the six-pac. Some aircraft may be spotted on the catapults or in the "ready" position behind the catapults, clear of the JBD's.

When in a turn-up position, the engine exhaust should go outboard over the side of the deck whenever possible.

During a launch, some of the GO aircraft could be spotted on the hangar deck, brought up to the flight deck on the aircraft elevator during the launch, and started.

A launch spot sheet prepared by the ACHO is used to indicate the location of the aircraft, also up and down traffic for the aircraft elevators, as well as some special maintenance requirements such as a tail over deck (TOD), and a birdcage over deck (BCOD). A copy of the sheet is given to each director on the flight deck. This spot sheet may include specific notes for launching sequences.

Catapult Launching

The takeoff requirements of jet aircraft necessitate the use of the catapult for launching. With the use of modern catapults, the time interval between the last launch and the next launch depends more on the flight deck directors and catapult spotters than on the catapults. The most experienced directors are assigned as catapult spotters. There is no room for the smallest error by the spotter if a good launch interval is to be maintained.

Nose Gear Launch

The nose gear launch equipment is designed to assist in launching aircraft by means of attaching the nosewheel strut to the towing mechanism of the catapult. This means of launching aircraft permits a positive and automatic engagement of aircraft to the catapult and a smooth and rapid operation.

CATAPULT SPOTTING. The catapult spotter taxis the aircraft to the mouth of the approach ramp. The launch bar is then lowered to engage the aircraft to the approach ramp. This provides positive steering into the buffer assembly.

CAUTION

Taxi speeds into the nose gear launch assembly must **NOT** exceed 4 knots. This is approximately equal to a normal walking pace, and is considered the maximum taxi speed for any aircraft to engage the nose gear launch assembly.

AIRCRAFT HOOKUP. The aircraft engages the nose gear launch assembly (buffer) and is taxied forward until the launch bar is positioned in front of the shuttle spreader. Upon signal from the catapult hookup petty officer, the catapult spotter then gives the **TENSION AIRCRAFT** signal. The hookup petty officer will then closely observe the launch bar in relation to the shuttle spreader to ensure correct positioning of the launch bar. See figure 3-9.

When an aircraft is being spotted on the catapult in preparation for launch, the following procedures are used:

1. The catapult officer informs the director when to start bringing the aircraft on the catapult before the first launch.

2. As the aircraft is positioned on the catapult, the squadron's aircraft inspector inspects the aircraft to make sure that it is properly configured and ready for flight. They give a **THUMBS UP** signal (day) or display a blue wand held vertically (night) to indicate that the aircraft is ready for launch. The aircraft

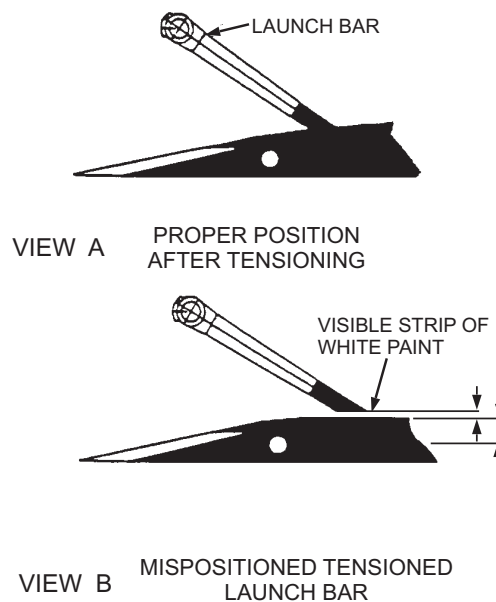
inspector continuously displays this signal at a position from which clearly visible to the launching officer. Should an aircraft inspector want to prevent the aircraft from being launched, they immediately gives a **SUSPEND** signal (day) or display a blue wand moved horizontally (night) to the director or launching officer who has control of the aircraft at the time the discrepancy is discovered.

WARNING

Aircraft must **NOT** have the launch bar over the shuttle spreader until the aircraft is armed and properly configured for flight.

3. In positioning an aircraft on the catapult, the director must be acutely aware of the activities of the catapult crewmembers. The director must control the aircraft's speed and movement in such a way that personnel safety will not be jeopardized. Pilots must guard against the tendency to add excessive power, which invariably results in roughness and poor control and jeopardizes launching accessories.

4. The aircraft is directed to the mouth of the approach track. See view A, figure 3-10. As soon as the aircraft's nosewheel reaches the aft end of the approach track, the director gives the pilot the **APPLY BRAKES** signal, (signal No. 10, fig. 3-1). The director then stops the aircraft at the entryway area of the guide track. The holdback man attaches the holdback bar if it is not previously attached.



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Figure 3-9.—Launch bar and shuttle spreader. A. Correct positioning. B. Incorrect positioning.

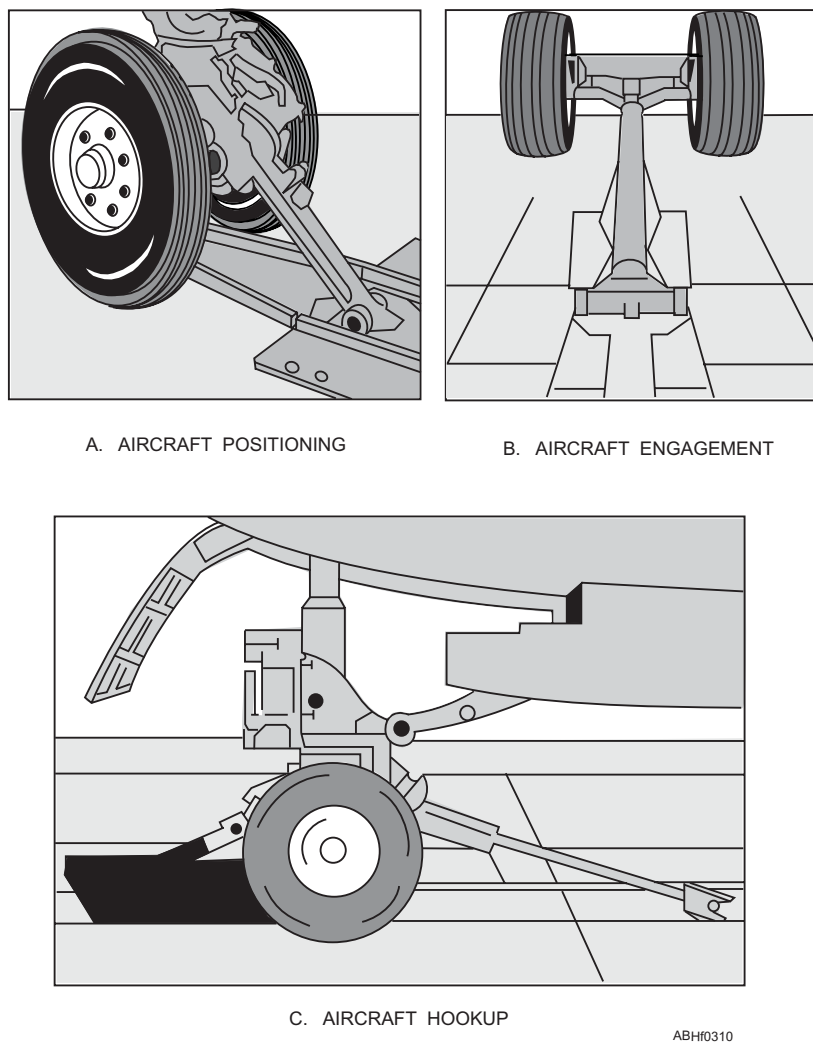


Figure 3-10.—Nose gear launch operation. A. Aircraft positioning; B. aircraft engagement; and C. aircraft hookup.

5. The director signals the pilot and hookup petty officer, where applicable, to lower the launch bar (signal No. 2 of fig. 3-2). The launch bar is then lowered.

6. The director makes sure the nose gear launch equipment is ready.

7. The director gives the pilot the **RELEASE BRAKES** signal (signal 10 of fig. 3-1) and the **TAXI FORWARD** signal (signal No. 8 of fig. 3-1).

NOTE

When ordnance is to be armed, the aircraft is stopped before full buffer penetration with the launch bar resting on top of the shuttle. All hookup personnel should clear the area until

arming procedures are complete. When the area is cleared, the director signals the pilot forward to hookup position and the hookup petty officer to return under the aircraft.

WARNING

Squadron aircraft inspectors must **NOT** perform inspections while an aircraft is taxiing. To prevent injury, they must remain well clear of rolling tires at all times.

8. The aircraft taxis forward and the launch bar lugs slide into grooves in the guide track. The grooves in the guide track contain and align the launch bar, and the steering of the aircraft is thus controlled. As the aircraft continues forward, the launch bar contacts the buffer hook actuator, causing the buffer hook to be

raised above the deck level. The aircraft continues at the same velocity until the holdback bar engages the buffer hook (fig. 3-10, view B).

9. Aircraft hookup is achieved as the launch bar is seated in the throat of the spreader assembly during aircraft tensioning (fig. 3-10, view C.)

10. When the aircraft reaches the hookup position, the hookup petty officer visually checks that the launch bar has dropped into proper position in front of the shuttle spreader. Should the bar fail to drop, the hookup petty officer directs a catapult crewmember to manually depress it to ensure hookup.

WARNING

You should make sure that the launch bar is properly positioned so that it will engage the spreader cutout when tension is applied.

11. When the aircraft is ready for tensioning and upon signal from the hookup petty officer, the director gives the **TENSION AIRCRAFT** signal to the deck edge control-panel operator and/or the ICCS operator and the pilot. See signal No. 5 of figure 3-2.

12. Upon seeing the director's **TENSION** signal, the pilot increases engine thrust to the level authorized by the applicable NATOPS aircraft manual.

13. The deck edge control panel operator or the ICCS operator checks the panel to make sure no catapult suspend lights are on. He presses the bridle tension push button, and advises the main control console operator by sound powered phone, saying the words *taking tension*. Under normal conditions, this is the last word passed over the sound powered phones until the launch is complete and the next launch cycle begins.

WARNING

After tension is taken on an aircraft having a launch bar selector switch, the pilot must NOT place the switch in the **OFF**, **ABORT**, or **RETRACTED** position until he receives the **RAISE LAUNCH BAR** signal from the director. See signal No. 3 of figure 3-2.

14. After tension has been applied and all personnel have cleared the area, the hookup petty officer must positively determine that the aircraft launch bar is properly seated in the shuttle spreader and verify that tension has been applied. He or she then

gives the **GO** signal (thumbs up) to the director and the catapult officer. See signal No. 19 of figure 3-2.

NOTE

When an aircraft has a launch bar selector switch, the director, upon receiving the **GO** signal (thumbs up) from the hookup petty officer, gives the **RAISE LAUNCH BAR** signal to the pilot. See signal No. 3 of figure 3-2. The pilot then places the launch bar selector switch in the appropriate position.

15. When the director is satisfied that the aircraft is ready for launching and the catapult area is clear, he or she passes control of the aircraft to the catapult officer by giving the **PASS CONTROL** signal. See signal No. 21 of figure 3-2.

WARNING

Should there be any doubt in the minds of the topside safety petty officer, director, squadron aircraft checker, or any other individual on the flight deck as to satisfactory hookup, aircraft configuration or proper catapult condition, they will so indicate to the catapult officer or for ICCS operations the catapult safety observer by initiating a crossed arm **SUSPEND** signal (day) or horizontal wand movement (night). See signal No. 12 of figure 3-2.

16. Any person who sees a situation that warrants a **SUSPEND** must immediately signal **SUSPEND** to the launching officer/catapult safety observer. Any person who observes the **SUSPEND** signal must immediately repeat the signal.

17. Any person who observes any unusual conditions during the launch, such as objects falling from or striking the aircraft, must immediately report the facts to responsible personnel.

For detailed information on nose gear launch procedures, you should refer to the following manuals:

- CV NATOPS Manual, NAVAIR 00-80T-105.
- Air Department Standard Operating Procedures (SOP), COMNAVAIRPAC/COMNAVAIRLANTINST 3100.4.
- Mk 2 Nose Gear Launch Equipment, NAVAIR 51-25-19 are available in the V-2 division maintenance office.