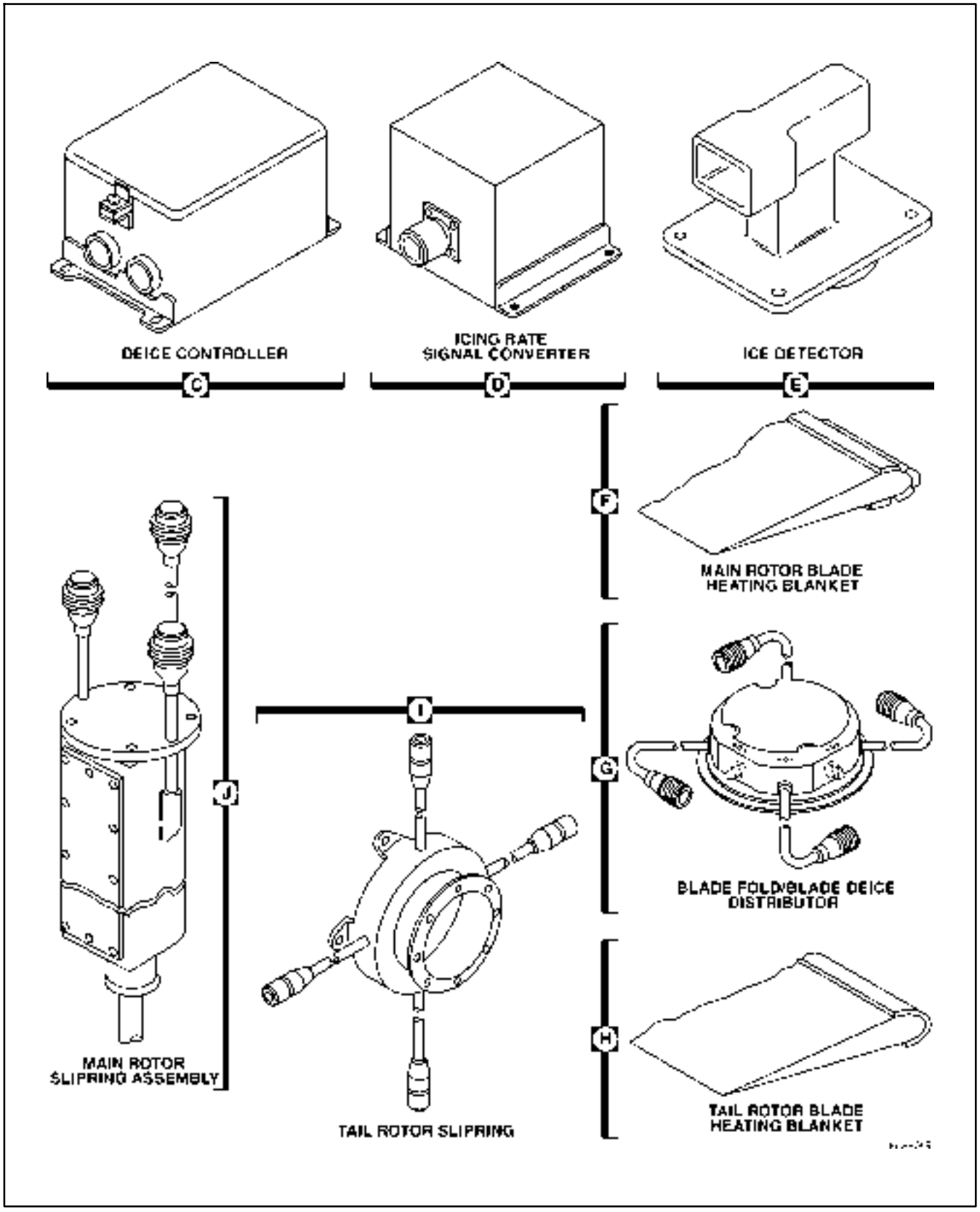


Figure 2-56. Blade De-Ice System (Sheet 2)

2.18.3.3 BLADE DE-ICE TEST Panel

The control for checking de-ice caution lights and Built-in Test (BIT) circuitry is on the BLADE DE-ICE TEST panel (Figure 2-53). Two amber PWR lights on the panel warn of power malfunctions of the main and tail rotor de-ice system.

2.18.3.4 BLADE DE-ICE TEST System Operation

The BLADE DE-ICE TEST panel allows the pilot to check the blade de-ice system for failures that are otherwise dormant during the normal test mode. The panel accomplishes this by introducing selected failure signals into the system and requiring the de-ice controller BIT circuitry to function in a specific manner. Blade De-Ice Test Panel Functions (Figure 2-55) are contained in Chapter 7.

2.18.4 Windshield Anti-Ice System

The wind-shield anti-ice system is used to prevent ice and fog from forming on the windshields. The pilot and copilot windshields are electrically heated safety glass with heating elements and built-in temperature sensors. Both windshields have their own separate anti-ice system. Each system is operated by a separate switch on the upper console, (Figure 1-6), marked WINDSHIELD ANTI-ICE, and separate anti-ice controllers in the junction boxes. Placing either the COPILOT or the PILOT WINDSHIELD ANTI-ICE switch to the ON position sends power to the windshield-heating elements. Placing the DE-ICE MASTER switch in AUTO will turn both windshield anti-ice systems on, regardless of WINDSHIELD ANTI-ICE switch position, when the ice detector senses ice formation.

2.18.5 Pitot Heater System

Heaters, located in the pitot tubes and static ports keep ice from forming on the tubes and ports and help keep moisture out. The pitot-static heaters are controlled by the PITOT HEAT switch, labeled ON and OFF, located on the upper console. When the PITOT HEAT switch is ON, power is fed to the right and left pitot tube heaters and static ports causing the heaters to go on. When a low-heat or no-heat condition is sensed with the PITOT HEAT switch ON, the RIGHT and/or LEFT PITOT HEAT caution(s) will illuminate.

WARNING

Pitot heat shall be turned on when visible moisture is present and/or the OAT is 5 °C or below. Failure to turn on pitot heat in these conditions may result in erratic stabilator programming.

Note

Pitot heaters are not to be used to warm flight equipment.

2.18.6 Windshield Wiper and Washer System

2.18.6.1 Windshield Wiper System

The electrically operated windshield wiper system consists of a two-speed motor and a control knob. The rotary-type knob is marked PARK, OFF, LOW, and HI and is located on the overhead console, marked WINDSHIELD WIPER. When the knob is placed in the LOW or HI position, the system is actuated, and the desired speed range is selected. When the knob is placed in the PARK position, the wipers are automatically positioned to the inboard edge of the windshields.

CAUTION

To prevent possible damage to the windshield surface, do not operate the windshield wipers on a dry windshield.

2.18.6.2 Windshield Washer System

The system consists of a reservoir, windshield washer motor, and a control switch. The reservoir, located to the right of the pilot's seat, gravity-feeds the windshield washer motor. The windshield washer motor is controlled by a switch on the overhead console, marked WINDSHIELD WASHER ON and OFF. Placing the switch in the ON position causes the windshield washer motor to pump fluid through the wiper spray bars to the windshield.

2.19 SEATS

2.19.1 Cockpit and Sensor Operator Seats

Each seat is a one-piece aluminum bucket attached to two energy absorption tubes and can be adjusted for leg length and height. Each seat is positioned on a track with the cockpit seat buckets directly above recesses in the cockpit floor. Crash loads are reduced by allowing the seat and occupant to move vertically as a single unit. Occupant restraint is provided by a shoulder harness, lap belts, and a crotch belt.

2.19.1.1 Seat Adjustment

Seat adjustment is controlled by levers on the front of the seat bucket (Figure 2-57). The levers return to the locked position when released. When the levers are pulled forward, the seat can move 5 inches vertically or horizontally and be locked at 1/2 inch intervals. Springs are installed to counterbalance the weight of the seat. The seat is designed to sustain a 14-g deceleration throughout the length of the seat stroke. Length of the stroke is a function of the seat height and at higher seat-height adjustments, higher crash loads can be absorbed.

2.19.1.2 Seat Belts

The seats each contain a shoulder harness, lap belt, and a crotch strap connected to a common buckle assembly. All belts and straps have adjustment fittings. The common attachment buckle has a single-point release. When turned in either direction, it simultaneously releases all belts and straps.

2.19.1.3 Shoulder Harness Lock Lever

A two-position shoulder harness lock lever is on the left side of each seat. When the lever is in the unlocked (rear) position, the dual-shoulder harness will extend 12 inches to allow the occupant to lean forward. The inertia reel will automatically lock if a force of 3 g's is encountered, allowing only harness retraction. When this occurs, the inertia reel lock will prevent further extension until the lever is cycled. When the lever is placed in the locked (forward) position, the reel lock prevents extension of the harness (Figure 2-57).

2.19.2 Sensor Operator Instructor and Passenger Seats

An SO instructor seat is provided for use during training or proficiency check flights. A passenger seat is located against the aft cabin bulkhead. Each seat is a cable-supported, steel-tube assembly with a fire-resistant, high-strength fabric seat and backrest. Each seat has a complete lap belt and dual torso-restraint shoulder harness, attached to a rotary release buckle. The seats are designed to protect the occupant in a crash. This is done by an attenuating system consisting of an energy-absorbing telescopic leg brace, combined with two rotary attenuators on the seat-back support cables.

2.19.3 RMU-42/A — Mobile Aircrew Restraint System

The mobile aircrew restraint system (MARS) in Figure 2-58 is designed to provide in-flight fall protection and prevent ejection of cabin aircrew in survivable crashes while minimizing the strike envelope within the cabin and to improve aircrew mobility while performing mission requirements. The MARS components consist of a webbing retractor assembly, a webbing strap assembly, and a ceiling retaining plate.

The crewmembers aircraft safety belt backstrap, in conjunction with the webbing strap assembly, will provide the crewmember with an approximate 7-foot perimeter when fully extended. The crewmembers aircraft safety belt should be worn over the flight equipment, high up on the chest and should be snug, without discomfort or breathing restriction. Proper wear of the belt will prevent inadvertent release of the latch mechanism and minimize personal injury.

WARNING

- Improper positioning of the crewmembers aircraft safety belt MS16070-21/A when donned could result in personal injury in the event of an aircraft emergency.
- The MARS is not designed to replace a crashworthy seat during controlled takeoff and landing. Always strap into the seat in accordance with current NATOPS procedures.
- Whenever possible, ensure the RMU-42/A retractor is in the locked position when performing the mission, especially when working in close proximity to the main cabin door.

2.20 RESCUE HOIST

The rescue hoist system (Figure 2-59) consists of a hoist assembly, hoist control panel, hover trim control panel, relays, circuit breakers, and necessary electrical wiring. The hoist is hydraulically powered from the backup pump, and its speed is variable from zero to 215 fpm for Breeze Eastern units or zero to 250 fpm for Lucas Western units. It is enclosed in a sheet metal fairing and is supported by a fixed tubular strut enclosed in a fiberglass fairing above the cabin door. The strut is bolted to a support fitting on the fuselage at station 335.75. The hoist and strut can be swung down as a unit, providing clearance for removal of the right engine intake without hoist disconnection or removal. The hoist contains 200 usable feet of cable and has a guillotine-type cable cutter and an automatic cable brake. The first and last 20 feet of the cable are bright orange to warn of end approach. The hoist hook is attached to the cable end by a ball bearing swivel. The hoist assembly comprises a winch, hydraulic drive motor, heat exchanger, fan, and control box.

2.20.1 Rescue Hoist Control Panel

The hoist control panel (Figure 2-59) is on the right side of the cabin, aft of the cabin door. It controls backup power, when needed in an emergency, by means of a BACKUP CONTROL POWER switch which, when pressed, turns on the switch light, indicating that backup control is activated. The hoist is then controllable by the HOIST UP-DOWN control switch only, at a fixed speed of 85 fpm. The hoist control panel also contains a NORMAL POWER light as an indication of power status and a HYD OVERHEAT light to indicate when the hydraulic oil temperature is over 116 °C.

Note

Backlighting for the hoist control panel is controlled by the lower console panel light rheostat.

2.20.2 Hover Trim Control Panel

The hover trim control panel (Figure 2-59) is in the cabin above the hoist control panel. It is used to control the hover position of the helicopter during a rescue operation within prescribed limits by means of a crewman-operated hand grip. This hand grip contains a pressure-activated thumb control for helicopter positioning and an ICS switch. The hand grip also contains a thumbwheel hoist control switch on BuNo 164174 and subsequent to allow coordinated hover positioning, communication, and hoist control from the hand grip. The panel also contains the crewman hoist shear switch, rescue light switch, hover trim light, and a rescue station dome light rheostat.

Note

Backlighting for the hover trim control panel is controlled by the lower console panel light rheostat.

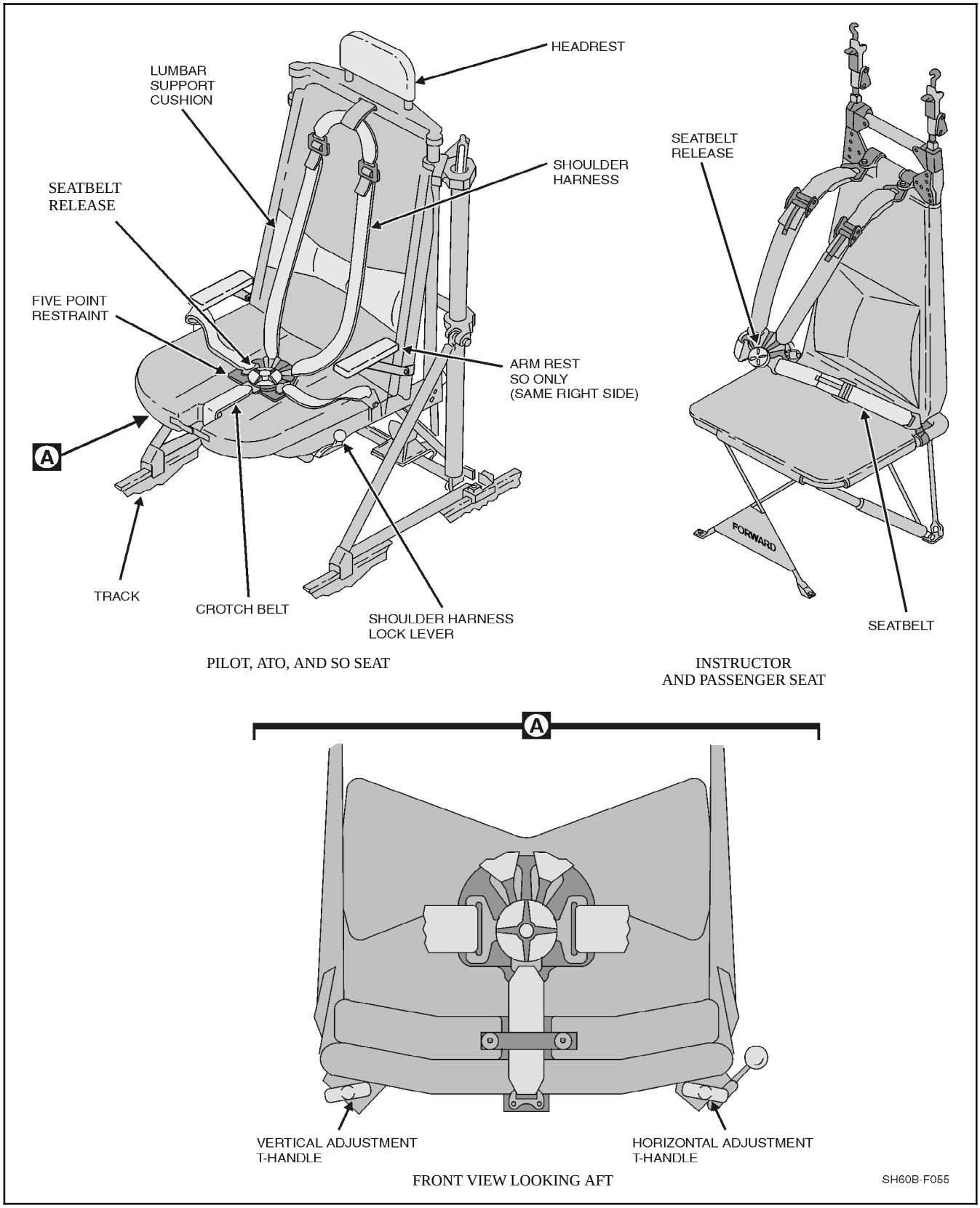


Figure 2-57. Personnel Seats

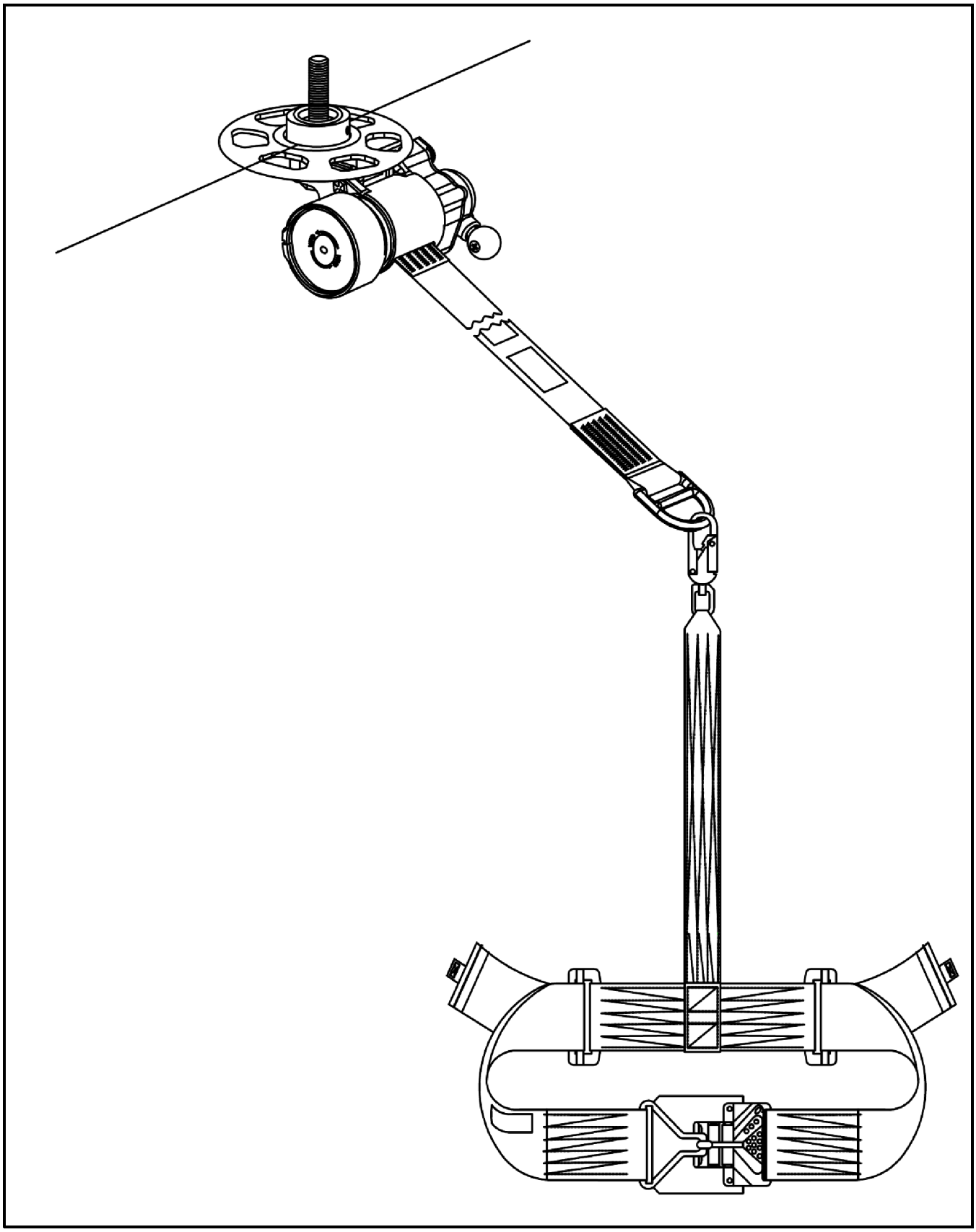


Figure 2-58. Mobile Aircrew Restraint System (MARS)

2.20.3 Hoist Operation

Hydraulic power at a flow rate of 5.5 gpm (normal) and 2,700 psi (minimum) pressure is supplied to the rescue hoist from the utility module via the rescue hoist manifold and pressure/return lines routed within the support strut fairing. The pressure line contains a priority valve that isolates the rescue hoist when hydraulic pressure decreases to 2,050 psi. The return line contains a temperature sensor switch that provides the signal to the HYD OVERHEAT warning light on the hoist control panel. Operation of the rescue hoist is controlled in either of three ways for BuNo 164173 and previous or four ways for BuNo 164174 and subsequent:

Note

- Selecting BACKUP HYD PMP ON with the SACs running will cause a restart of the AOP. The AOP may cause equipment faults to be indicated; however, no damage to equipment occurs, and the faults may be cleared by using CLEAR ALERT CUE or INIT TEST.
- Constant tension should be maintained on the hoist cable to prevent birdcaging.

1. The primary method is from the cabin by means of the crewman pendant.
2. The secondary method is by means of the crewman-operated hand grip (BuNo 164174 and subsequent only).

The pendant contains an ICS switch, a thumbwheel hoist control switch, and a CARGO HOOK RELEASE switch. The hoist can be raised or lowered at any speed up to 215 fpm, from either the hand grip or the pendant, depending on the thumbwheel pressure applied. The hoist control switch is spring loaded to the neutral position.

Note

Aircraft equipped with the Lucas-Western hoist are capable of hoist speeds up to 250 fpm. Lucas-Western hoists can be identified by a completely enclosed hoist cable drum.

3. The tertiary method is from the cockpit by means of the HOIST switches at the top of the pilot and ATO cyclic grips. These switches can raise or lower the hoist at a fixed speed of 100 fpm. When this mode is activated, it will override the primary pendant control of the crewman or the crewman-operated hand grip (BuNo 164174 and subsequent only). The cyclic grips also contain the EMER REL switches to shear the hoist.

Power for primary, secondary, and tertiary modes of operation is provided from the NO. 2 DC primary bus through a circuit breaker marked RESCUE HOIST CONTR on the SO circuit breaker panel and controlled through the RESCUE HOIST switch on the overhead control panel.

4. The quaternary (emergency) method is from the cabin by means of the RESCUE HOIST BACK-UP CONTROL POWER switch and HOIST UP-DOWN switch on the hoist control panel. These respectively provide emergency power and control the direction of the hoist at a fixed speed of 85 fpm. The BACK-UP CONTROL and HOIST UP-DOWN switches operate emergency up, down, and shutoff valves in the hoist, overriding failure or seizure on the normal control switches and normal up, down, and shutoff valves in the hoist.

Power for the backup control mode of operation is provided from the NO. 1 DC primary bus through a circuit breaker marked RESCUE HOIST CONTR on the SO circuit breaker panel.

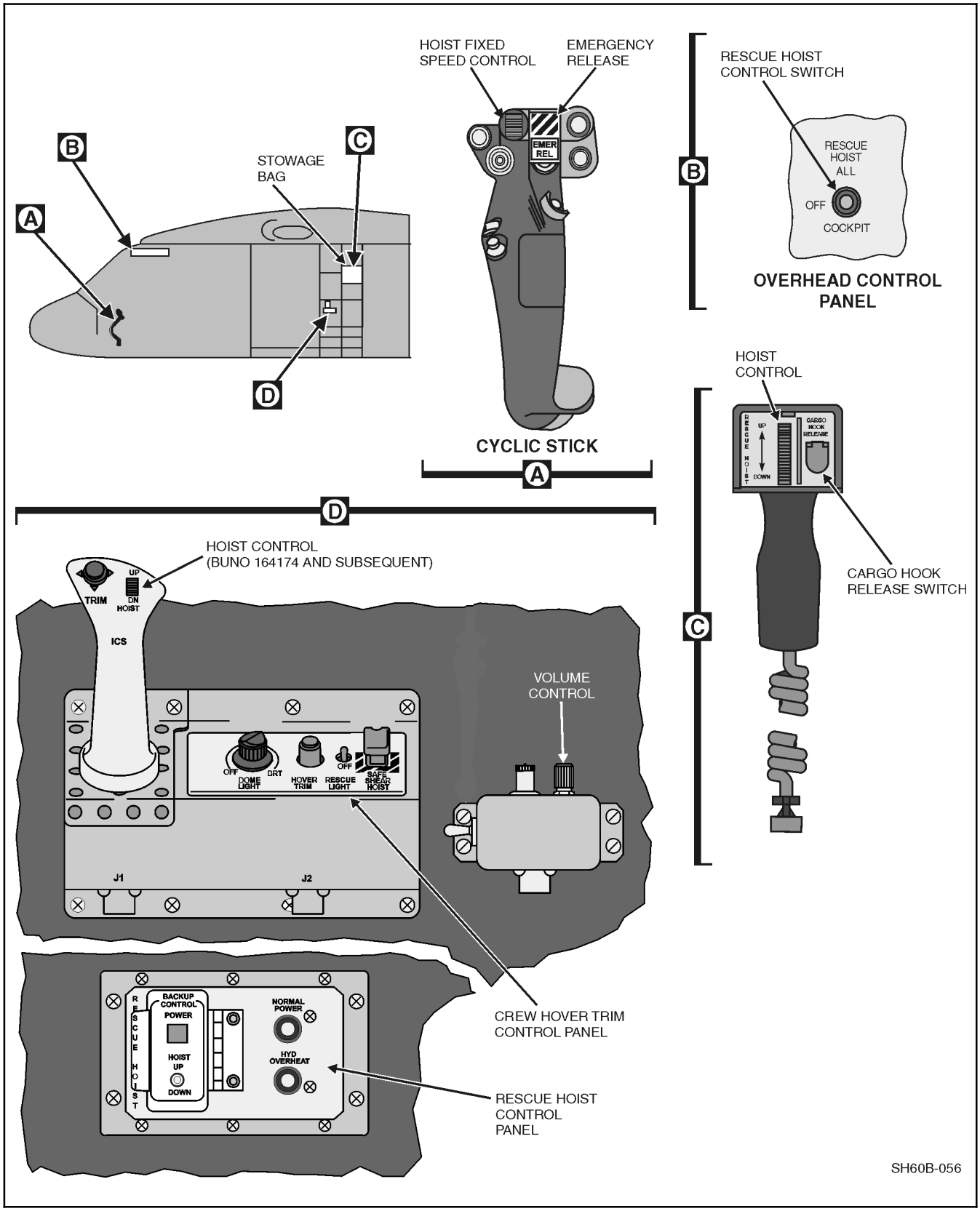


Figure 2-59. Rescue Hoist System (Sheet 1 of 2)

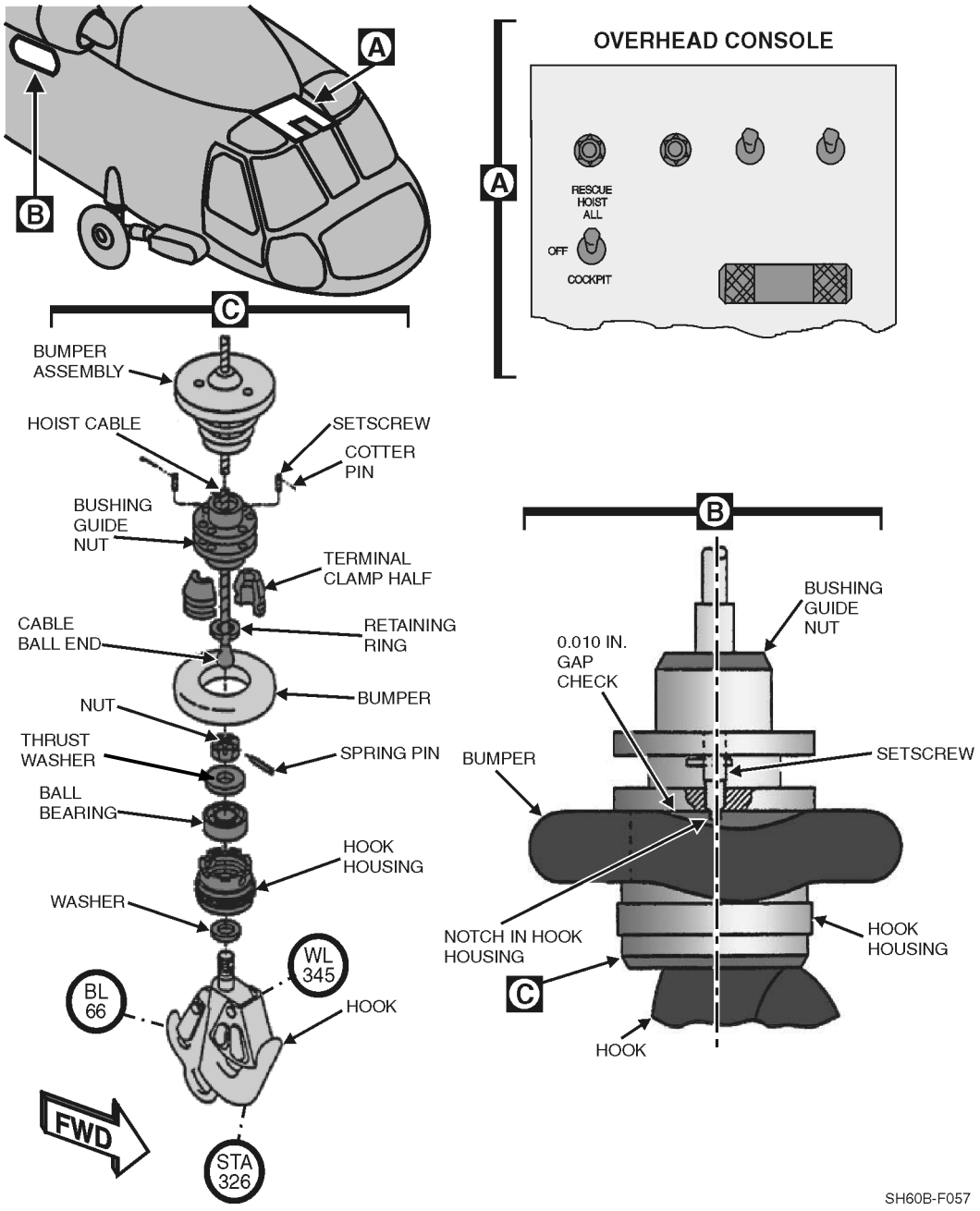


Figure 2-59. Rescue Hoist System (Sheet 2)

If the overhead control panel RESCUE HOIST switch is OFF, neither the crewman pendant nor the cyclic grip HOIST controls are operative. If the overhead switch is at COCKPIT or ALL, the crewman pendant hoist switch and the cyclic grip hoist control switches are operative. The BACKUP CONTROL POWER switch and HOIST UP–DOWN switches are unaffected by the selection of the overhead control panel switch. When the hoist is being operated by the pendant switch or a cyclic grip switch, the hoist is automatically stopped at the fully up or fully down position by internal limit switches. If the primary down limit switch fails, a second limit switch is activated. Normal operation of the rescue hoist is no longer available. Backup (emergency) operations must be selected to bypass the failed switch. Once the cable has been moved beyond the failed switch, normal hoist operation is available; however, the limit switches are ineffective when the hoist is being operated by the BACKUP HOIST UP–DOWN switch. When the hoist is being raised or lowered at a speed exceeding 50 fpm, it will automatically decelerate to 50 fpm at approximately 10 feet from fully up position, or approximately 5 feet from fully lowered position.

CAUTION

When hoisting in backup control, the upper and lower electrical limit switches are inoperative. Continued operation after the hook is full up can severely damage the hoist. The cable may become disconnected from the cable reel when operating the hoist with the cable in the warning range (painted orange).

2.20.4 Hoist Cable Shear

Hoist cable shearing is by a guillotine cartridge controlled by the rescue hoist shear relay which can be energized either from the cabin HOVER TRIM panel SHEAR switch or the EMER REL switch on top of the pilot and ATO cyclic grips, which energizes the master shear relay when helicopter is airborne. When the helicopter weight is on the wheels, all jettison stations are inoperative. If the overhead RESCUE HOIST control switch is at OFF, neither the hover trim panel SHEAR HOIST switch nor the cyclic grip EMER REL switches are operative. If the RESCUE HOIST control switch is in the COCKPIT position, only the cyclic grip emergency release switches are operative. If the overhead RESCUE HOIST control switch is at ALL, the hover trim panel SHEAR HOIST switch and cyclic grip EMER REL switch are operative. Power is provided from the DC essential bus through a circuit breaker marked EMERG RELEASE HOIST CABLE SHEAR and located on the overhead console circuit breaker panel.

CAUTION

If the MAD, RAST, cargo hook, or rescue hoist are on, then their respective shear circuits are also activated and will fire if the EMER REL switch is depressed.

2.20.5 Hoist Auxiliary Cooling

The hoist assembly has an integral oil cooler in the aft cowling. Air is forced through by an electrically driven fan when hoist power is applied.

CAUTION

Failure to secure the RESCUE HOIST switch when not conducting hoist operations could result in the failure of the rescue hoist auxiliary cooling fan motor.

2.21 CARGO HOOK SYSTEM

The external cargo hook (Figure 2-60) has a rated capacity of 6,000 pounds and has a jaw opening of 2.12 inches. Its location on the bottom fuselage centerline, just aft of the main rotor centerline, was selected to provide ease of accessibility and to minimize aircraft pitch and roll reactions to cargo swing. The hook is installed in a semirigid mounting located in the cargo hook well underneath the cabin floor and below the aircraft center of gravity. When not in use, the hook is stowed horizontally in the well. Primary electrical release controls are provided for the pilot, ATO, and crew operator (Figure 2-60). A mechanical release is provided on the hook for groundcrew operation and is accessible from the cabin for aircrew operation in the event of aircraft electrical malfunction. Emergency release can be initiated from either EMER REL button located on the cyclic grips. When the CARGO HOOK EMER RLSE switch is in the NORM position and the CARGO HOOK SAFE/ARMED switch is ARMED, pressing the EMER REL button applies 28 Vdc to an explosive cartridge in the cargo hook. This causes the lock assembly to open and the weight of the cargo will cause the load arm to open. The lock assembly must be reset manually and a new explosive cartridge must be installed. Power to operate the emergency release system is from the DC essential bus through a circuit breaker, marked EMERG RELEASE CARGO HOOK. The circuit breaker is on the overhead circuit breaker panel.

2.21.1 Cargo Hook Electrical Release

The cargo hook control panel, located on the overhead console (Figure 1-6), consists of an EMER RLSE TEST switch, a TEST light, a CONTROL station selector switch (labeled COCKPIT and ALL), and an ARMING switch (marked SAFE and ARMED). Placing the ARMING switch to the ARMED position provides power to the release circuit and illuminates the HOOK ARMED light on the advisory panel. The pilot and ATO cyclic grip normal release switches will release the load when the CONTROL switch is at COCKPIT or ALL position. The crewman HOOK RELEASE switch, located on the crewman hoist pendant, releases the load when the CONTROL switch is at ALL position. When the load is released, the CARGO HOOK OPEN advisory light goes on. The power for the normal electrical release is supplied by the NO. 2 DC primary bus through two circuit breakers, marked CARGO HOOK PWR and CONTR, located on the SO circuit breaker panel.

2.21.2 Cargo Hook Emergency Release Test

The cargo hook emergency-release circuit tester, located on the overhead console, marked CARGO HOOK EMER RLSE, contains a test indicator and switch (Figure 2-60). The test light, marked TEST, goes on during circuit testing to indicate that the system is functioning properly.

The tester checks the pyrotechnic squib circuitry for an open circuit at the OPEN position and short circuits at the SHORT position. Electrical power is supplied by the DC essential bus through a circuit breaker marked EMERG RELEASE, CARGO HOOK. The circuit breaker is located on the overhead circuit breaker panel.

2.22 EMERGENCY PANEL

The emergency panel (EMER PNL) is located in the center section of the lower console as shown in Figure 2-61. It provides two separate functions. These are:

1. Fuel dump.
2. Stores jettison.

Fuel dump functions are discussed in this chapter and Chapters 12. The stores jettison function provides a single point, all stores release feature. Depressing the ring-guarded pushbutton activates the all stores jettison function. All stores jettison will jettison all stores and cycle the sonobuoy launcher through all tubes launching each sonobuoy/signal underwater sound (SUS) in sequence. Any armed weapon will be set to a safe state prior to jettison. The system does not allow jettison isolation of sonobuoys or weapons pylons. Signal inhibit boxes prevent the jettison of auxiliary fuel tanks when they contain less than approximately 272 pounds of fuel. The jettison operation is completed within four seconds. The stores jettison function is powered by the NO. 1 DC primary bus through a circuit breaker on the ATO circuit breaker panel marked ARMAMENT JETT A and by the NO. 2 DC primary bus through circuit breakers on the ATO circuit breaker panel marked ARMAMENT JETT B and ARMAMENT SYS on aircraft prior to BuNo 162349. Effective on aircraft BuNo 162349 and subsequent, stores jettison is powered by the NO. 1 DC primary bus through circuit breakers marked ARMAMENT JETT A and ARMAMENT JETT C, and by the NO. 2 DC primary bus through circuit breakers marked ARMAMENT JETT B and JETT D on the ATO circuit breaker panel. These circuit breakers provide dual redundancy in the jettison function of each configuration of the aircraft.

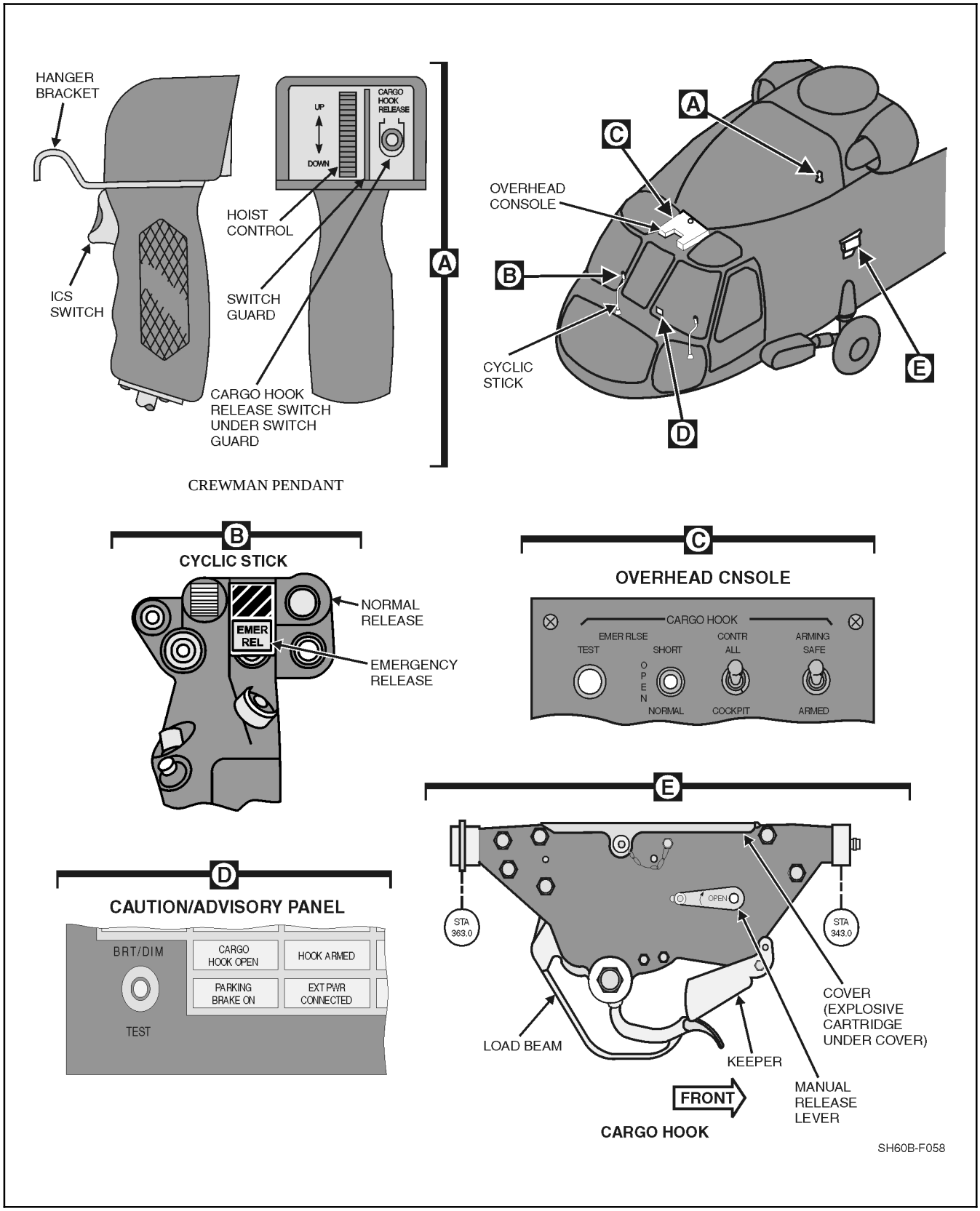


Figure 2-60. Cargo Hook System

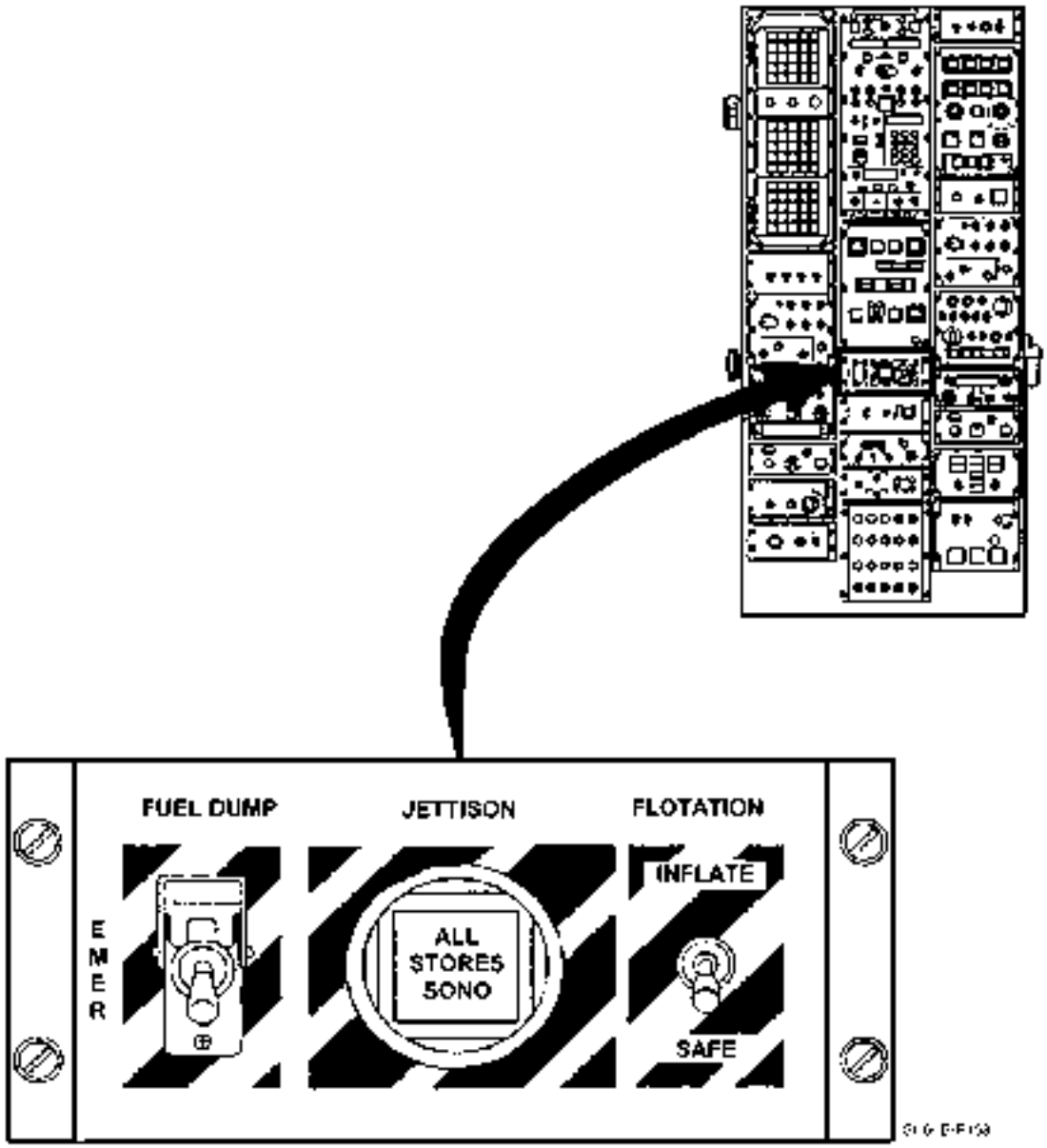


Figure 2-61. Emergency Panel (EMER PNL)

Note

- In the event of a total electrical failure, stores jettison is inoperative.
- If a weapon has been selected and armed, the jettison system will disarm the weapon before it is jettisoned.
- The stores may be emergency jettisoned in flight by the jettison system regardless of the position of the MASTER ARM pushbutton switches. If pressure is less than 900 psi, all sonobuoys may not jettison.
- The ARA controls port forward jettison regardless of ACI station selection. The forward station releases one second after the aft stations. The ARA power utilizes ARMAMENT JETT C and JETT D circuit breakers. ARMAMENT JETT A and ARMAMENT JETT B support ASDC jettison of aft stations and sonobuoys.
- The ARA supplies LK/UL status to the ACI.
- The ARA provides default locking of unselected port stations and simultaneous nose-tail arming for selected portside stations.

2.23 SURVIVAL AND EMERGENCY EQUIPMENT

2.23.1 Survival Equipment

Flight personnel shall be familiar with and utilize those items of flight clothing and survival and rescue equipment as prescribed in the current NATOPS General Flight and Operating Instructions (OPNAVINST 3710.7 series). In addition, the pilot in command of an aircraft engaged in carrying crewmen or passengers shall ensure their compliance with this instruction.

2.23.2 Emergency Equipment

Emergency equipment (Figure 2-62) includes two portable fire extinguishers, two first aid kits, a crash ax, two water canteens, and an emergency locator transmitter (ELT).

2.23.2.1 Emergency Locator Transmitter Systems

The Emergency Locator Transmitter (ELT) System consists of a transmitter (portable) and two antennas (one portable, collapsible, vertical monopole antenna and one monopole antenna with an interconnecting coaxial cable for aircraft antenna feed). The transmitter is mounted on the control-enclosure bulkhead behind the pilot seat. The transmitter is normally connected to the antenna in the transition section via the coaxial cable, but the collapsible antenna may be connected for portability. The transmitter is a self-contained, dry-cell, battery-operated unit. When turned on by an ON-OFF-ARM switch, it simultaneously transmits a distress signal on the international distress frequencies of 121.5 MHz and 243.0 MHz. The distress signal may travel as far as 100 miles, at a search altitude of approximately 10,000 feet. When the selector switch is placed to ARM, the transmitter will automatically activate upon a forward impact force of 5 g's. With the switch ON, the transmitter is activated. The signal emitted by the transmitter, when activated, is a tone that varies from l,600 Hz to 300 Hz, at a rate of 2 to 3 times per second.

Testing of the transmitter is done by on-the-air operation in one of the two following methods:

1. A test may be made with a control tower after receiving permission to activate the transmitter. Placing the selector switch ON for not more than 5 seconds is enough to check operation. The tower will confirm transmitter operation.
2. A test may also be made with an onboard UHF or VHF radio monitoring GUARD frequency. The selector switch is placed to ON for 2 to 5 seconds and the radio receiver will confirm locator transmitter operations. The selector switch shall be returned to ARM if the operational check was satisfactory.

Note

On-air operational checks are to be done as quickly as possible, between on-the-hour and 5 minutes after-the-hour and for not more than 5 seconds.

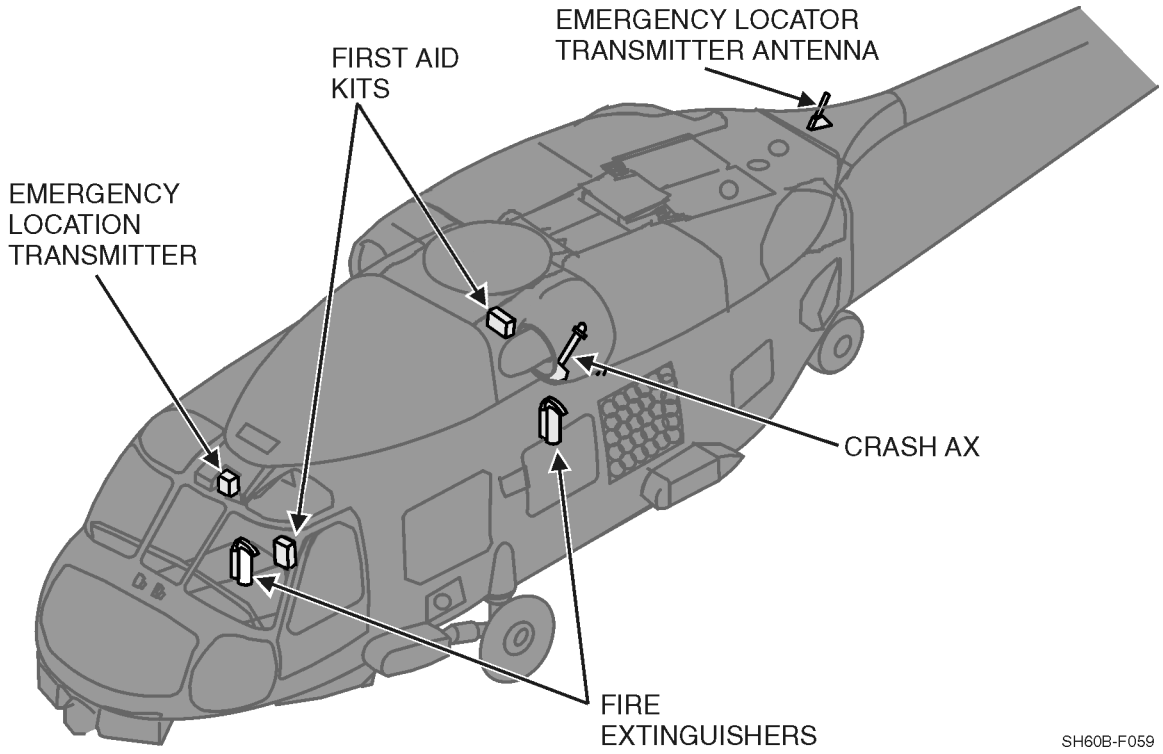


Figure 2-62. Emergency Equipment Location

2.23.2.2 Helicopter Emergency Egress Lighting System

The HEELS automatically provides emergency lighting of the cabin door and SO window (Figure 2-63). The system consists of four light tube assemblies, two control unit assemblies, one control panel, a signal conditioner, and an additional N_r sensor located on the left-hand accessory module. The SO window has one 5 foot light tube strip forming an inverted U over the window. The cabin door has three 30-inch light tube assemblies mounted on the sound-proofing arranged around the cabin door as an inverted U.

There are two control units, each containing a battery pack, a test switch, and an indicator light. One control unit is for the cabin door, and the other is for the SO window. The test switch tests the battery. The battery pack provides power to light the tubes during emergency operation. When activated, the batteries should illuminate the tubes for approximately 10 minutes.

CAUTION

HEELS is intended for emergency operation only and shall not be used for nonemergency lighting.

The arm switch located on the SO utility light panel allows for remote testing and arming of the HEELS. The test switch is a momentary position switch used in conjunction with the arm switch for preflight testing of the HEELS (Figure 2-63).

To test the control units, depress the test switch located on each unit for a minimum of 6 seconds. The green LED next to the test switch will illuminate and maintain intensity as long as the switch is depressed. If the light dims or does not illuminate, the batteries should be replaced.

The light assemblies are powered by two control units. The control units are activated by loss of an inhibit signal received from the rotor head speed signal conditioner (total loss of AC power or a drop of rotor N_r below 80 percent).

The system is powered by the NO. 1 DC primary bus 28 Vdc through a circuit breaker on the SO circuit breaker panel marked HEELS. Anytime the HEELS system is armed, the control units batteries are being charged.

2.23.2.3 Advanced Helicopter Emergency Egress Lighting System

Advanced Helicopter Emergency Egress Lighting System (ADHEELS) automatically provides emergency lighting of the cabin door and SO window. The system consists of 3 fiber light assemblies, a control module, remote test assembly, and a crash/inversion sensor. The cabin door control module and crash/inversion sensor are located aft of the rescue station. The SO window control module and crash/inversion sensor are located forward of the SO window.

ADHEELS operates independently of aircraft power and is activated when any of the following is detected by the crash/inversion sensor:

1. Water immersion.
2. Impact force of 11-13 g's or greater.
3. Attitude changes of 100 ±5° or greater.

When one of the above conditions is met, the control module activates the fiber light assembly, which will remain illuminated for a minimum of 45 minutes. The ADHEELS system, when inadvertently activated, can be reset by momentarily depressing the remote test switch.

The remote test switch, when pressed and held in the down position, will perform the system built-in test function and the light strip assembly will illuminate within 6 seconds. The test switch automatically resets the system when released.

2.23.2.4 Individual Helicopter Emergency Egress Lighting System

Individual Helicopter Emergency Egress Lighting System (IHEELS) automatically provides emergency lighting of both the cabin door window and the SO window jettison handles. Each system consists of a light strip containing

the inversion sensor and a circuit module which contains the battery pack and the immersion contacts. Each light strip is powered by a battery and activated independently. Activation occurs when the inversion sensor detects one to the following:

1. Water immersion
2. Attitude changes of 100 ±5° or greater.

When the test button is pressed, a brief flash of the light strip assembly indicates a successful system test. Both the test and reset buttons must be depressed with a pen–like object. Since a time delay inhibit is built into the system test circuitry, the operator must wait 5 minutes before performing an additional test.

2.24 MISCELLANEOUS EQUIPMENT

2.24.1 Rearview Mirrors

External rearview mirrors are installed on either side of the cockpit. The mirror permits the pilot to observe the MAD towed body deployment, recovery/docking, and hoist operations, and the ATO to observe sonobuoy deployment.

2.24.2 Drinking Water Container

Two standard water canteens are provided; one is located in the cockpit on the left side of the center console and another canteen is located on the port cabin bulkhead.

2.24.3 Crewman Safety Belt Anchor Points

The three crewman safety belt anchor points are located in the cabin overhead. One is above the SO seat and two are aft at the rescue seat attachment points.

WARNING

Crewman safety belts do not provide impact protection; therefore, use of those belts shall be restricted to only those occurrences when mission accomplishment requires persons to be out of their seats. Such belts shall not be worn when strapped into a seat.

2.24.4 Litter Installation Equipment

Litter installation equipment is located aft of the SO seat, under the sonobuoy launcher. It provides the necessary means to secure a litter for transportation of an injured person. The equipment includes the litter support assembly, the litter tiedown strap assembly, and the rescue equipment net assembly.

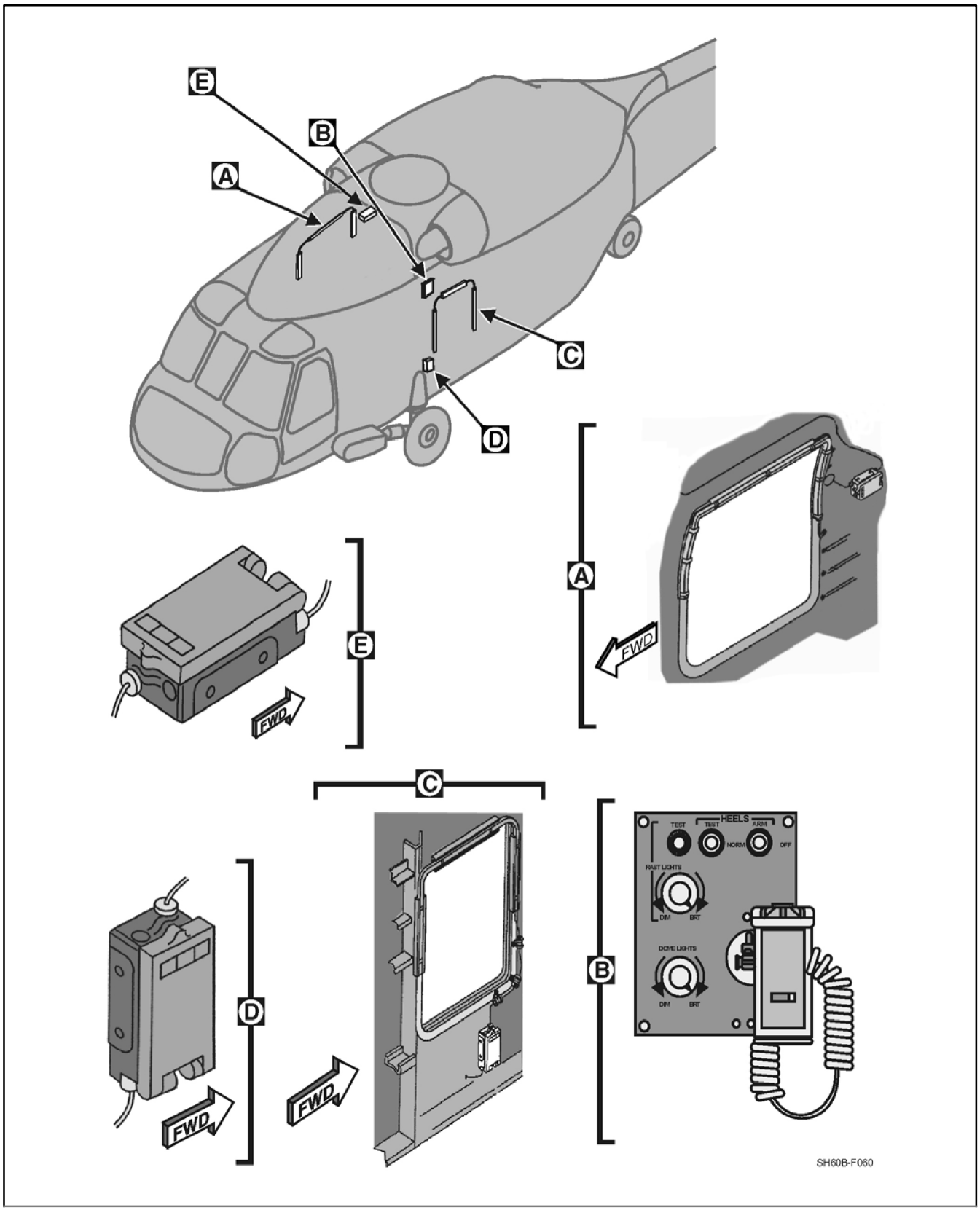


Figure 2-63. HEELS Equipment

CHAPTER 3

Servicing and Handling

3.1 SERVICING DATA

Servicing information is given by systems or components. Points used in frequent servicing and replenishment of fuel, oil, and hydraulic fluid are shown in Figure 3-1. A listing of acceptable commercial and foreign fuel is shown in Figure 3-2. Fuel and lubricant specifications and capacities are shown in Figure 3-3.

All PQMs and aircrewmen qualified in model are authorized to perform servicing and handling of the aircraft when qualified maintenance personnel are not available. All ground/taxi hand signals shall be in accordance with NAVAIR 00-80T-113.

3.2 FUEL SYSTEM SERVICING

Fueling equipment shall be operated only by qualified and authorized personnel. Using loose pyrotechnics, smoking, striking matches, working on aircraft, or using any device producing flame within 50 feet of the helicopter is strictly prohibited. The helicopter should not be parked in the vicinity of possible sources of ignition such as blasting, drilling, or welding operations. A minimum of 50 feet should be maintained from other aircraft or structures, and 75 feet should be maintained from any operating radar set. When the aircraft is being refueled, a check shall be made to ensure no electrical extension cords, droplights, floodlights, etc. are in or near the helicopter. Flashlights shall be used in place of helicopter landing/flood lights for night fueling operations. During all fueling operations, fire extinguishing equipment shall be readily available. Electrical power will have to be applied to the helicopter to obtain the fuel quantity gauge readings.

WARNING

- Flameouts may be encountered on the ground and in flight at certain fuel temperatures when restricted fuels JP-4 or JET B are used. Nose pitch attitudes, roll attitudes, and low power operations all contribute to the formation of vapor bubbles in the fuel lines of SH-60B aircraft due to fuel boost limitations. Prolonged on-deck operations such as refueling contribute significantly to this problem when using JP-4/JET B at any altitude.
- If JP-4 is used, the following operational restrictions apply: All takeoffs shall stabilize in a hover with no fuel pressure caution lights for a minimum of 10 seconds before commencing transition to forward flight. Single-engine training operations shall not be conducted while using JP-4/JET B.
- Due to the vapor qualities of mixed JP- 4/JET B and JP-5/JET A, the next two refuelings with JP-5 or JET A shall be treated as if it were JP-4/JET B, that is, the same operational restrictions apply as for JP-4/JET B.

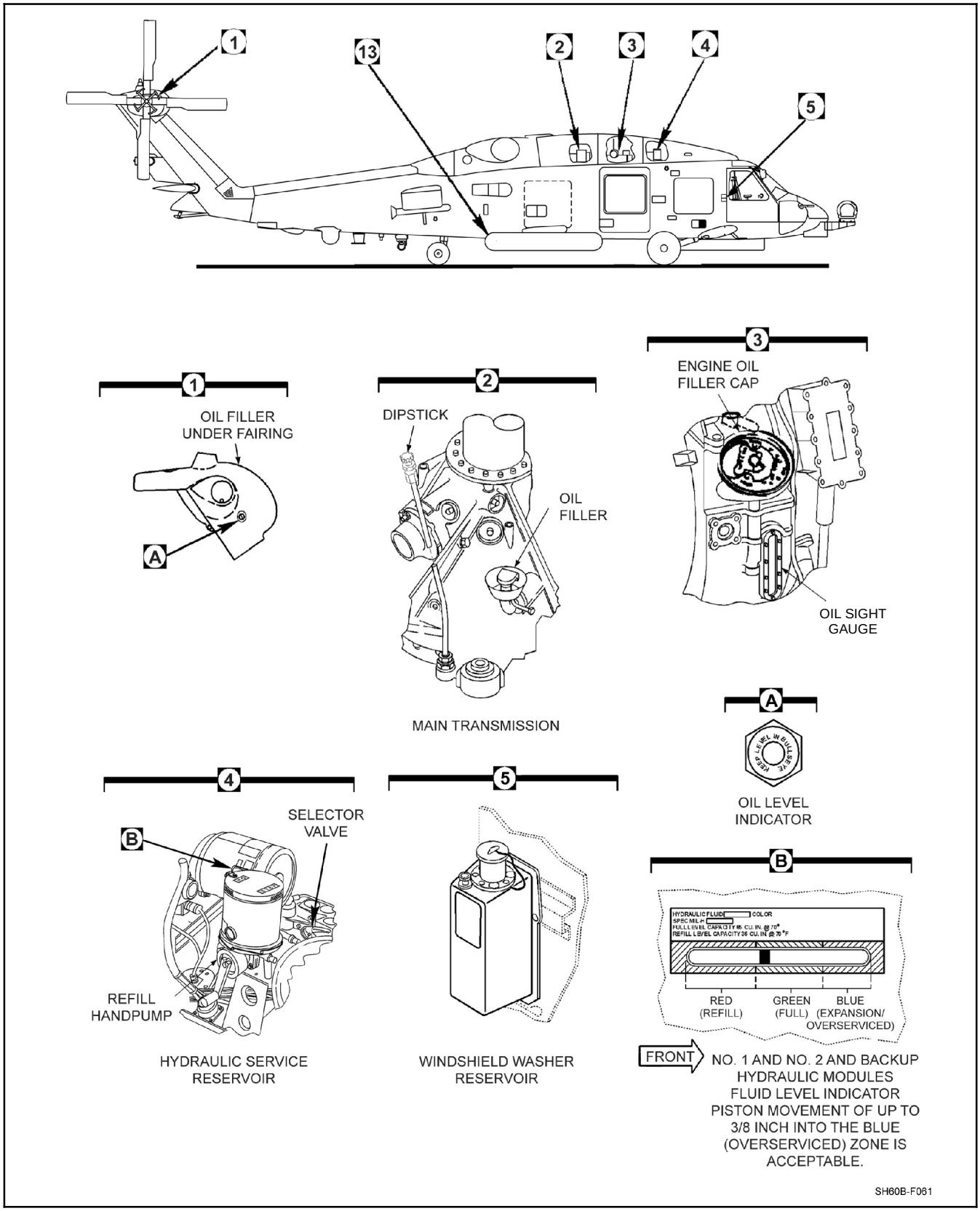


Figure 3-1. Aircraft Servicing (Sheet 1 of 3)

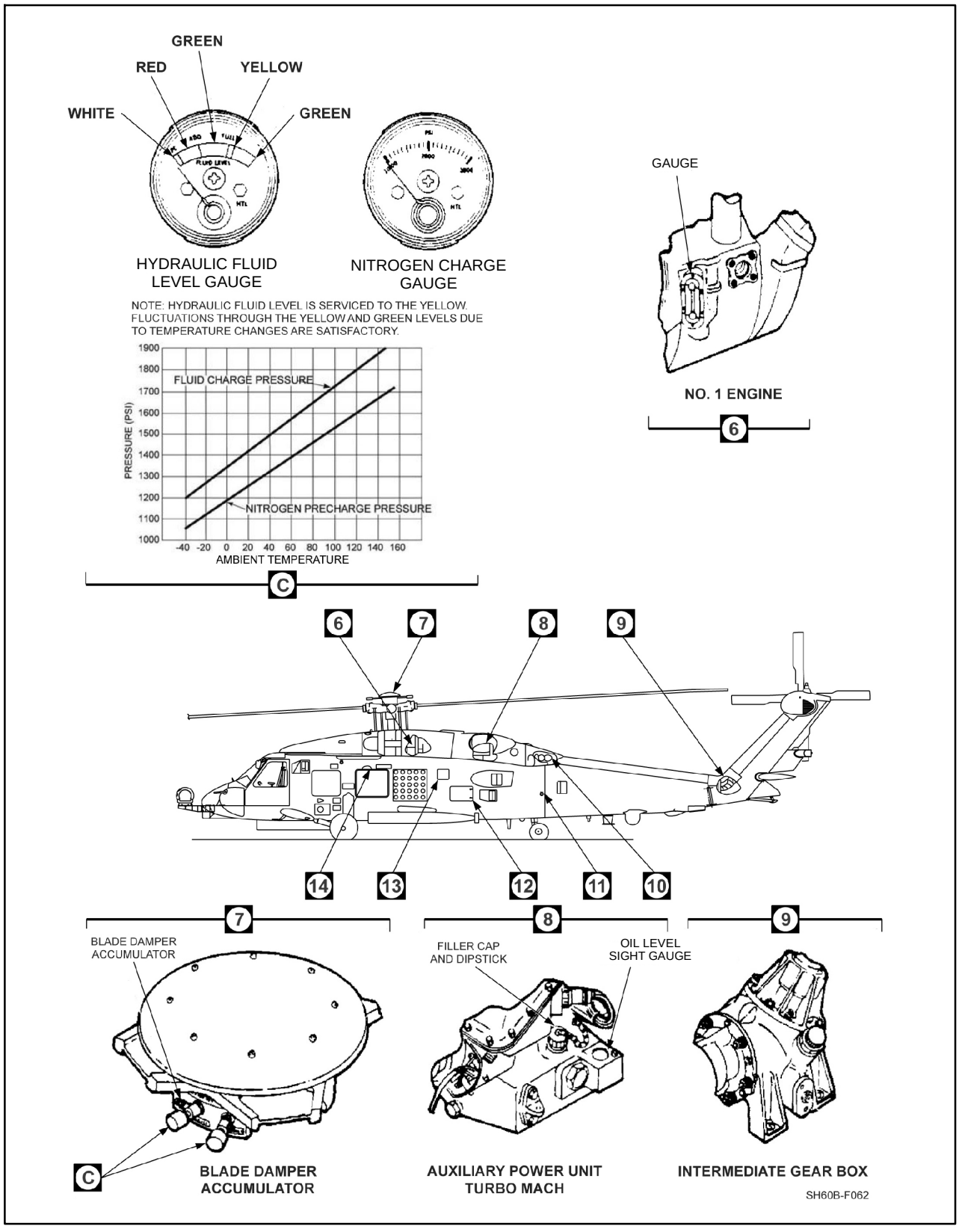
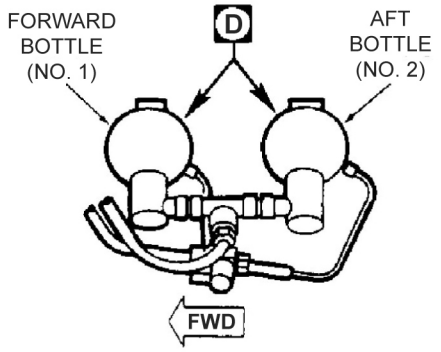


Figure 3-1. Aircraft Servicing (Sheet 2)



FIRE EXTINGUISHER BOTTLES

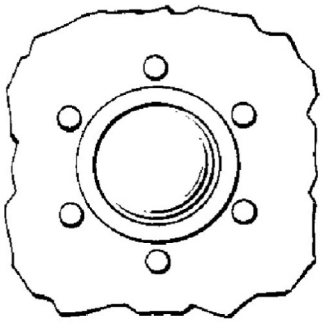
10

TEMP - PRESSURE RANGE

°F	-40°	-20°	0°	+20°	+40°
PSIG	292	320	355	396	449
	370	400	437	486	540
°F	+60°	+70°	+80°	+100°	+120
PSIG	518	555	593	670	775
	618	660	702	748	885

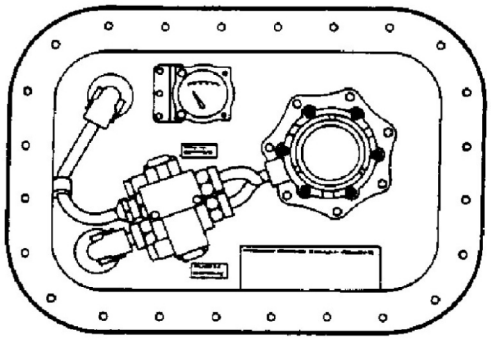
TEMPERATURE VS PRESSURE DATA PLATE

D



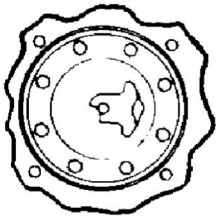
FIRE EXTINGUISHER THERMAL EXPANSION DISCHARGE INDICATOR (FRANGIBLE DISC)

11



PRESSURE REFUEL STATION

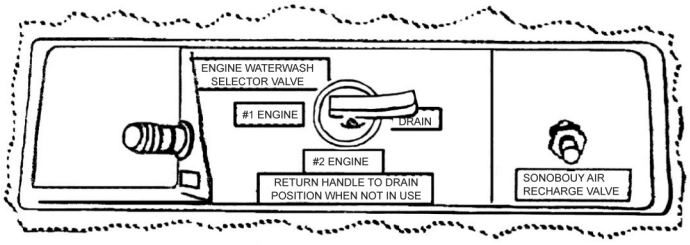
12



GRAVITY REFUEL

13

14



ENGINE WATERWASH/SONOBOUY CHARGE PANEL

SH60B-F063

Figure 3-1. Aircraft Servicing (Sheet 3)

	US MIL CODE	NATO CODE	US MILITARY SPECIFICATION	COMMERCIAL DESIGNATION (SPECIFICATION)	BRITISH DESIGNATION (SPECIFICATION)	WT (lbs/gal)	COMMENTS
PRIMARY FUELS	JP-5	F-44	MIL-DTL-5624	NONE	DEF STAN 91-86 (AVCAT/FSII)	6.8	1A, 2
	JP-8	F-34	MIL-DTL-83133		DEF STAN 91-87 (AVTUR/FSII)	6.7	1A, 2, 5
	NONE	F-35	MIL-DTL-83133	JET A-1 (ASTM D-1655)	DEF STAN 91-91 (AVTUR)	6.7	1A, 3, 4, 5
	NONE	NONE	NONE	JET A-1 (ASTM D-1655)	NONE	6.7	1A, 3, 4, 5
	NONE	NONE	NONE	GOST 10227 GRADE TS-1	NONE	6.7	1A, 3, 4, 5, 6
RESTRICTED FUELS	JP-4	F-40	MIL-DTL-5624	JET B (ASTM D-6615)	DEF STAN 91-88 (AVTAG/FSII)	6.5	1B, 3, 4, 5, 7, 8
EMERGENCY FUELS	JP-8 +100	F-37	MIL-DTL-83133	NONE	DEF STAN 91-87 (AVTUR/FSII + S-1749)	6.7	1C, 2, 5, 9, 10

WARNING

IN ORDER TO ENSURE THAT A HELICOPTER CAN BE SAFELY HANGARED ABOARD SHIP, THE HELICOPTER SHOULD BE FUELED WITH JP-5 (F-44) PRIOR TO FLYING ABOARD A SHIP. WHEN FUELING WITH JP-5 IS NOT POSSIBLE, HELICOPTERS SHALL NOT BE HANGARED UNTIL THE FLASHPOINT OF THE FUEL IN THE HELICOPTER FUEL TANKS IS ABOVE 120 °F.

NOTE

- FOR PLANNING PURPOSES, A FUEL MIXTURE OF 70% JP-5 (F-44) AND 30% JP-8 (F-34) OR JET A-1 (F-35) WILL ENSURE THAT THE MINIMUM FLASHPOINT OF THE FUEL MIXTURE IS ABOVE 120 °F.
- SHIP'S FUEL PERSONNEL HAVE TEST EQUIPMENT FOR MEASURING FUEL FLASHPOINT. FIGURE 4 OF MIL-HDBK-844A(AS) (AIRCRAFT REFUELING HANDBOOK FOR NAVY/MARINE CORPS AIRCRAFT) CAN BE USED WITH THE MEASURED FLASHPOINT TO DETERMINE MORE ACCURATELY THE PERCENTAGE OF JP-5 (F-44) REQUIRED TO RAISE THE FLASHPOINT OF JP-8 (F-34) OR JET A-1 (F-35) ABOVE 120 °F.
- NAVAIR 00-80T-109 (AIRCRAFT REFUELING NATOPS MANUAL) CONTAINS PROCEDURES THAT MUST BE FOLLOWED WHEN HANGARING HELICOPTERS CONTAINING FUEL OTHER THAN JP-5 (F-44).
- PILOTS/AIRCREW SHALL ENSURE THAT AIRCRAFT MAINTENANCE DEPARTMENTS ARE INFORMED WHEN AIRCRAFT ARE FUELED WITH THE EMERGENCY FUEL JP-8+100 (F-37).
- NAVAIR 00-80T-109 (AIRCRAFT REFUELING NATOPS MANUAL) CONTAINS SPECIAL PROCEDURES THAT MUST BE FOLLOWED WHEN IT BECOMES NECESSARY TO DEFUEL AIRCRAFT THAT HAVE BEEN FUELED WITH THE EMERGENCY FUEL JP-8+100 (F-37). SINCE THERE IS NO VIABLE FIELD TEST THAT CAN DETECT THE PRESENCE OF JP-8+100 (F-37), PILOTS/AIRCREW AND AIRCRAFT MAINTENANCE PERSONNEL SHALL ENSURE THAT FUELS PERSONNEL ARE INFORMED OF AIRCRAFT THAT HAVE BEEN FUELED WITH THE EMERGENCY FUEL JP-8+100 (F-37).

Figure 3-2. H-60 Series Common Fuel Reference Chart (Sheet 1 of 2)

COMMENTS

1. FUEL DEFINITIONS:
   a. PRIMARY FUEL – A FUEL THAT THE AIRCRAFT IS AUTHORIZED TO USE FOR CONTINUOUS UNRESTRICTED OPERATIONS.
   b. RESTRICTED FUEL – A FUEL WHICH IMPOSES OPERATIONAL RESTRICTIONS ON THE AIRCRAFT. THESE FUELS MAY BE USED ONLY IF NO PRIMARY MILITARY OR COMMERCIAL FUELS ARE AVAILABLE.
   c. EMERGENCY FUEL – A FUEL WHICH MAY BE USED FOR A MINIMUM TIME WHEN A PRIMARY FUEL IS NOT AVAILABLE AND AN URGENT NEED EXISTS (SUCH AS HURRICANE EVACUATION OR URGENT MILITARY NECESSITY). PILOT APPROVAL SHALL BE OBTAINED BEFORE SERVICING AND THE AIRCRAFT SHALL BE CONSPICUOUSLY PLACARDED WITH THE EMERGENCY FUEL GRADE WHEN SERVICED.
2. ALL US MILITARY AND NATO FUELS, EXCEPT F-35, CONTAIN AN ADDITIVE PACKAGE WHICH INCLUDES FUEL SYSTEM ICING INHIBITOR (FSII).
3. COMMERCIAL FUELS ARE AVAILABLE WITH AND WITHOUT FSII.
4. PRIST. A COMMERCIAL FSII ADDITIVE, PRIST, MAY BE USED WITH COMMERCIAL JET FUEL (JET A/JET A-1/JET B). PRIST IS EQUIVALENT TO THE MILITARY FSII ADDITIVE. IT IS AVAILABLE IN TWO FORMS: (1) AEROSOL CANS WHICH ARE DISCHARGED INTO THE FUEL AS IT IS PUMPED INTO THE AIRCRAFT AND (2) PREMIXED INTO THE FUEL. WHEN PRIST IS PREMIXED WITH THE FUEL IT PROVIDES ANTI-ICING PROTECTION EQUIVALENT TO THAT PROVIDED BY MILITARY JET FUEL AND IS AUTHORIZED FOR USE. PRIST IN AEROSOL CANS IS NOT AUTHORIZED FOR USE SINCE IT DOES NOT MIX WELL WITH FUEL, HAS A TENDENCY TO SETTLE TO THE BOTTOM OF FUEL TANKS, AND MAY DAMAGE FUEL SYSTEM SEALS AND FUEL TANK MATERIALS.
5. JP-4, JP-8, TS-1, JP-8+100 AND ALL COMMERCIAL JET FUELS SHALL NOT BE DEFUELED INTO SHIPBOARD JP-5 FUEL STORAGE TANKS BECAUSE THE FLASH POINT OF THESE FUELS IS LESS THAN 140 °F.
6. TS-1 IS A COMMERCIAL AVIATION KEROSENE MADE TO THE RUSSIAN FUEL SPECIFICATION GOST 10227. IT IS VERY SIMILAR TO ASTM JET A-1 WITH THE EXCEPTION THAT THE FLASH POINT IS APPROXIMATELY 20 °C LOWER THAN JET A-1. THIS FUEL IS COMMONLY AVAILABLE IN RUSSIA, PARTS OF CENTRAL EUROPE, THE CENTRAL ASIAN REPUBLICS AND AFGHANISTAN.
7. JP-4 (F-40) HAS BEEN REPLACED BY JP-8 (F-34) IN US AND NATO SERVICE. JP-4 (F-40) AND JET B ARE NO LONGER WIDELY AVAILABLE WORLDWIDE BUT MAY STILL BE ENCOUNTERED IN SOME AREAS.
8. SEE SPECIFIC T/M/S NATOPS MANUALS FOR RESTRICTIONS APPLICABLE TO THE USE OF JP-4 (F-40)/JET B.
9. JP-8+100 (F-37) CONTAINS A THERMAL STABILITY ADDITIVE THAT AFFECTS THE ABILITY OF THE COALESCING FILTER-SEPARATORS AND CENTRIFUGAL PURIFIERS (FILTRATION EQUIPMENT USED IN SHORE STATION AND SHIPBOARD FUEL STORAGE/HANDLING SYSTEMS) TO REMOVE FREE WATER AND FINE PARTICULATE MATTER FROM FUEL. NAVAIR 00-80T-109 (AIRCRAFT REFUELING NATOPS MANUAL) CONTAINS ADDITIONAL INFORMATION ON JP-8+100 (F-37).
10. NO USN/USMC AIRCRAFT ENGINES REQUIRE THE USE OF JP-8+100 (F-37). USN/USMC AIRCRAFT ARE NOT AUTHORIZED TO USE JP-8+100 (F-37) EXCEPT IN EMERGENCY SITUATIONS.

FOR ADDITIONAL INFORMATION ON AVIATION FUELS, CONSULT THE FOLLOWING:

1. NAVAIR 00-80T-109, AIRCRAFT REFUELING NATOPS MANUAL.
2. MIL-HDBK-844A (AS), REFUELING HANDBOOK FOR NAVY/MARINE CORPS AIRCRAFT.

Figure 3-2. H-60 Series Common Fuel Reference Chart (Sheet 2)

		PRIMARY PRODUCT		ACCEPTABLE SUBSTITUTE	
SYSTEM	CAPACITY	MIL SPEC	NATO CODE	MIL SPEC	NATO CODE
ENGINE OIL	7.3 U.S. QUARTS	MIL PRF 23699	O–156	MIL PRF 7808 (Notes 1, 2)	O–148
APU	2.0 U.S. QUARTS	MIL PRF 23699	O–156	None	None
MAIN TRANSMISSION	7.5 U.S. GALLONS	DOD PRF 85734	None	None	None
INTERMEDIATE GEARBOX	2.75 U.S. PINTS	DOD PRF 85734	None	None	None
TAIL GEARBOX	2.75 U.S. PINTS	DOD PRF 85734	None	None	None
HYDRAULIC RESERVOIRS	1.0 U.S. QUART	MIL PRF 83282	H 537	None	None
RESCUE HOIST	1.16 U.S. QUARTS	MIL PRF 23699	O–156	None	None
ENGINE STARTER	200 cc	MIL PRF 23699	O–156	None	None

CAUTION

The engine shall be drained and flushed when changing from MIL–PRF–23699 to MIL–PRF–7808 prior to operations in ambient temperatures below –40 °C.

Notes:

1. When starting in ambient temperatures of –40 °C or below, lubricating oil MIL–PRF–7808 shall be used.
2. When adding one authorized oil to another at ambient temperatures above –40 °C, the engine shall be drained. It is not necessary to flush the engine under these conditions.

Figure 3-3. Lubricants and Hydraulic Fluids Reference Chart

3.2.1 Fueling with Fuel Susceptible to Icing

Utilize the following procedure to keep the bulk fuel temperature above 0 °C and prevent engine flameout caused by fuel icing:

1. If the aircraft has been in heated hangar areas, the aircraft should be launched within one hour after being moved to the flight deck or towed to a turn–up area.
2. If the aircraft is outside for more than one hour, bulk fuel temperature should be checked by draining aircraft fuel into a bottle which has been outside approximately 15 minutes, a thermometer inserted, and temperature read.
3. If fuel is 0 °C or below, aircraft should be hangared until bulk fuel temperature rises above 0 °C or partially defueled and refueled with warm fuel so that bulk temperature rises above 0 °C.

3.2.2 Pressure Refueling

The helicopter fuel tanks are pressure refueled through a fitting on the left side of the aircraft. Pressure refueling does not require electrical power. The system should automatically shut off when the tanks are full. Before refueling, the helicopter and refueling-unit grounding devices should be inspected by fueling personnel for proper ground.

The procedures described in the following paragraphs shall be followed during refueling operations.

WARNING

Ensure sonobuoy launcher lock pin is in the LOCK position prior to refueling with sonobuoys loaded and system pressurized.

CAUTION

Fueling pressure shall not exceed 55 psi.

3.2.2.1 Helicopter On Deck

Asterisked (*) items apply only when engines and rotors are operating.

Note

Aircraft exhaust patterns are shown in Figure 3-4.

*1. Pilot maintains UHF communication with LSO, ground, or tower — As applicable.
*2. ALE-39 arming handles (ESP only) — SAFE.
*3. IRCM/HF — OFF.
4. Fuel management panel (BuNo 162349 and subsequent) — REFUEL as required.
5. Helicopter — Ground. Fuel vehicle (ashore only) — Ground to aircraft.
6. Fueling nozzle — Connect.
7. Fuel flow — Start (when directed by the pilot).

CAUTION

- Increase of intertank pressure as indicated by the tank pressure gauge entering the red band during pressure refueling denotes a clogged vent. Stop refueling immediately and investigate.
- Flow of fuel when precheck valve is in precheck position indicates a shutoff system malfunction. If both precheck valves fail to stop fuel flow, stop refueling to prevent overflow from tank vents. As long as one precheck valve is operative, the aircraft can be refueled safely.

8. Hold precheck valves in precheck position, one at a time — Fuel flow will stop within 10 seconds.
9. Release check valve and continue fueling until fuel flow stops.
10. Fueling nozzle — Disconnect and replace cap, close panel door.

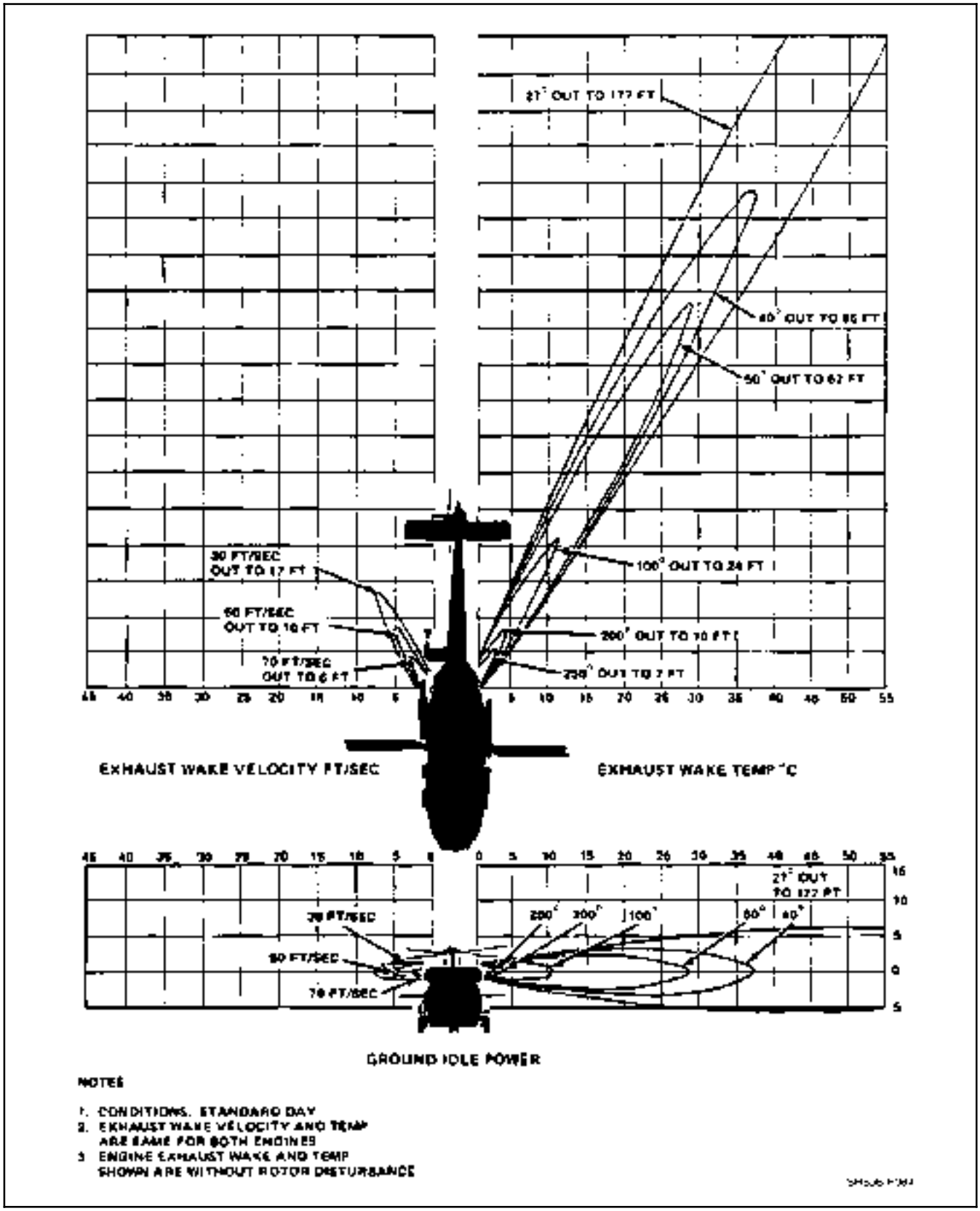


Figure 3-4. Aircraft Engine Exhaust Patterns

11. All grounding wires — Remove.

*12. IRCM/HF (ESP only) — ON.

*13. ALE-39 arming handles (ESP only) — ARM.

3.2.3 Gravity Fueling

The helicopter main tanks are gravity fueled through a filler cap on the left side of the helicopter. The external auxiliary fuel tanks are gravity fueled individually. Before fueling, grounding devices on the helicopter and on the fuel truck will be inspected by fueling personnel to be sure of proper ground. Before using a fuel hose, the hose nozzle must be grounded to grounding stations above or below the pressure refueling station. Before removing the filler cap, attach the hose nozzle grounding unit into the grounding jack. Replace the filler cap after filling tank.

WARNING

- Gravity fueling is not authorized with engines or APU operating. In addition to the hazard caused by the location of the tank openings relative to the engine exhaust, the rotors constantly build static electricity, creating an extremely dangerous spark potential.
- Internal tank pressure shall be checked prior to removal of the filler cap to prevent fuel spills.

3.2.4 Use of Different Fuels

When changing from one type of authorized fuel to another, it is not necessary to drain the fuel system before adding the new fuel. Fuels having the same NATO code number are interchangeable. Jet fuels conforming to the ASTM D-1655 specification may be used when MIL-T-5624 fuels are not available. When helicopters using NATO F-44 (JP-5) are refueled with NATO F-40 (JP-4) or commercial ASTM Type B fuels, the operating characteristics may change in that lower operating temperature, slower acceleration, easier starting, and shorter range may be experienced. The reverse is true when changing from F-40 (JP-4) fuel to F-44 (JP-5) or commercial ASTM Type A-l fuels.

3.2.5 RAST Operations for Aircraft Configured with External Auxiliary Fuel Tank

RAST operations may be performed on aircraft configured with a 120 gallon external auxiliary fuel tank provided the following limits and conditions are met:

1. Main and tail landing gear tires and oleo struts have been serviced prior to flight.

CAUTION

Strut servicing shall not be performed while the aircraft is over/in the RSD.

2. The static vertical clearance between the deck and the lowest point on the auxiliary fuel tank shell (not including the fin) shall not be less than 12.0 inches.

Note

Static vertical clearance is measured following any maintenance or servicing involving main landing gear or oleo struts.

3. Aircraft gross weight during RAST operations shall not exceed the gross weight of the helicopter at the time of the static vertical clearance measurement.

3.3 OIL SYSTEM SERVICING

3.3.1 Engine Oil Servicing

Both engine oil tanks (Figure 3-1) are within the main frame. Add oil if oil level in sight glass is less than halfway between add and full marks. Service to approximately one inch below the full mark or adjacent to the top set of bolts. If oil is at operating temperature, wait 20 minutes before checking oil level or servicing engine.

WARNING

Lubricating oils MIL-L-23699, MIL-L-7808, and DOD-L-85734 contain materials hazardous to health. These lubricating oils can produce paralysis if swallowed. Long-term contact may irritate the skin. Wash hands thoroughly after handling as they may burn if exposed to heat or flames. Use only with proper ventilation.

CAUTION

The helicopter must be level to get accurate oil tank readings. When the helicopter is parked on a slope, the downslope engine will read a higher oil level than actual, and the upslope engine will read a lower oil level than actual.

Note

Commercial oils listed are approved for use in engines and gearboxes except as indicated.

3.3.2 Main Transmission Oil System Servicing

The transmission oil supply is in the sump case with the filler port and dipstick gauge located on the right rear of the main module. When filling is required, oil is poured through the filler tube on the main module case. The oil level is checked by a dipstick, marked FULL and ADD. When the oil level decreases to the ADD mark on the dipstick, approximately 2 quarts of oil will be needed to return the level to FULL. The dipstick has both hot and cold scales.

3.3.3 Tail and Intermediate Gearbox Servicing

The intermediate gearbox oil level sight gauge (Figure 3-1) is located on the left side of the gearbox. The tail gearbox oil level sight gauge is on the right side. Each sight gauge contains inner and outer circles. The gearboxes are full when the oil level is within the inner circle when the pylon is spread. The oil level should be replenished if the bottom of the outer circle can be seen. Some aircraft are equipped with improved visibility sight gauges on the tail gearbox. They are labeled with upper and lower horizontal lines. The gearbox is full when the oil level is between the two lines when the pylon is spread. The oil level should be replenished if the level is below the lower line.

Note

During shipboard operations, the gearbox oil level sight gauge may not indicate properly due to the slope of the flight decks on certain ship classes.

3.4 HYDRAULIC SYSTEM SERVICING

Reservoirs (Figure 3-1) for the hydraulic system are on the hydraulic pump modules. Fluid-level sight gauges are visible on the side of each pump. All hydraulic pump reservoir capacities are 1 U.S. quart at the FULL mark. When the indicator reaches the refill (red) point, two-thirds of a pint is required to return the indicator to the full (green) mark. The fluid level indication is the 1/8-inch wide white stripe at the outboard edge of the level piston. To refill the reservoirs, the fluid is supplied from the manual hand pump. After flight, fluid in hydraulic systems will be hot. Piston movement of up to 3/8 inch into the blue (overserviced) zone is acceptable. When piston is beyond this limit, bleed off enough fluid to bring piston back to 3/8 inch above full limit.

Note

After operation, the indicator may show an overserviced condition. Accurate readings may only be made after fluid temperature has cooled.

To replenish the pump reservoir fluid:

1. Turn the selector valve to the reservoir to be filled. OUT 1 is the left pump module, OUT 2 is the right pump module, OUT 3 is the backup pump module, and OUT 4 is the rotor brake (stow position).
2. While holding the selector valve handle down, crank the hand pump clockwise and fill desired hydraulic pump module until the forward end of the reservoir window piston is at the forward end of the green decal on the reservoir housing. At the same time, push in and turn the bleed valve, and bleed air from the pump module. Release button when air-free oil shows.
3. Check that reservoirs stay full (forward end of piston at forward end of green decal), with fluid at ambient temperature 1 hour after flight.
4. Make sure area remains clean during procedure.
5. Stow selector valve handle in OUT 4 position.
6. Turn on electrical power.
7. Check caution panel for #1 RSVR LOW, #2 RSVR LOW, and BACK-UP RSVR LOW lights off.

3.4.1 Hand Pump Reservoir Servicing

Servicing of the refill hand pump (Figure 3-1) is done when fluid level decreases to the refill line on the fluid-level sight gauge on the side of the pump tank. When the fluid level decreases to the refill line, service is necessary to avoid allowing air into the rotor brake hydraulic system.

3.5 BLADE DAMPER ACCUMULATOR

The blade damper accumulator is serviced with a combination of hydraulic fluid and nitrogen. After proper servicing, the fluid-level gauge (Figure 3-1) should be in the green or yellow area. The nitrogen charge gauge should indicate the pressure for the ambient temperature (degrees F) listed on the accompanying chart.

3.6 SONOBUOY LAUNCHER PNEUMATIC SYSTEM SERVICING

The sonobuoy launcher pneumatic bottle is serviced from the waterwash/sonobuoy charge panel above the SO window, located on the left side of the helicopter (Figure 3-1).

The system shall be disarmed at the control panel in the cockpit and the valve safety lockout engaged in the rotary valve (Figure 3-5) before starting servicing. Attach a high-pressure air supply hose to the charge valve. Apply 1,200 to 1,250 psi and open the charge valve. Close the valve when the air bottle is charged. Verify approximately 1,200 psi on supply manifold gauge, and disconnect the supply hose.

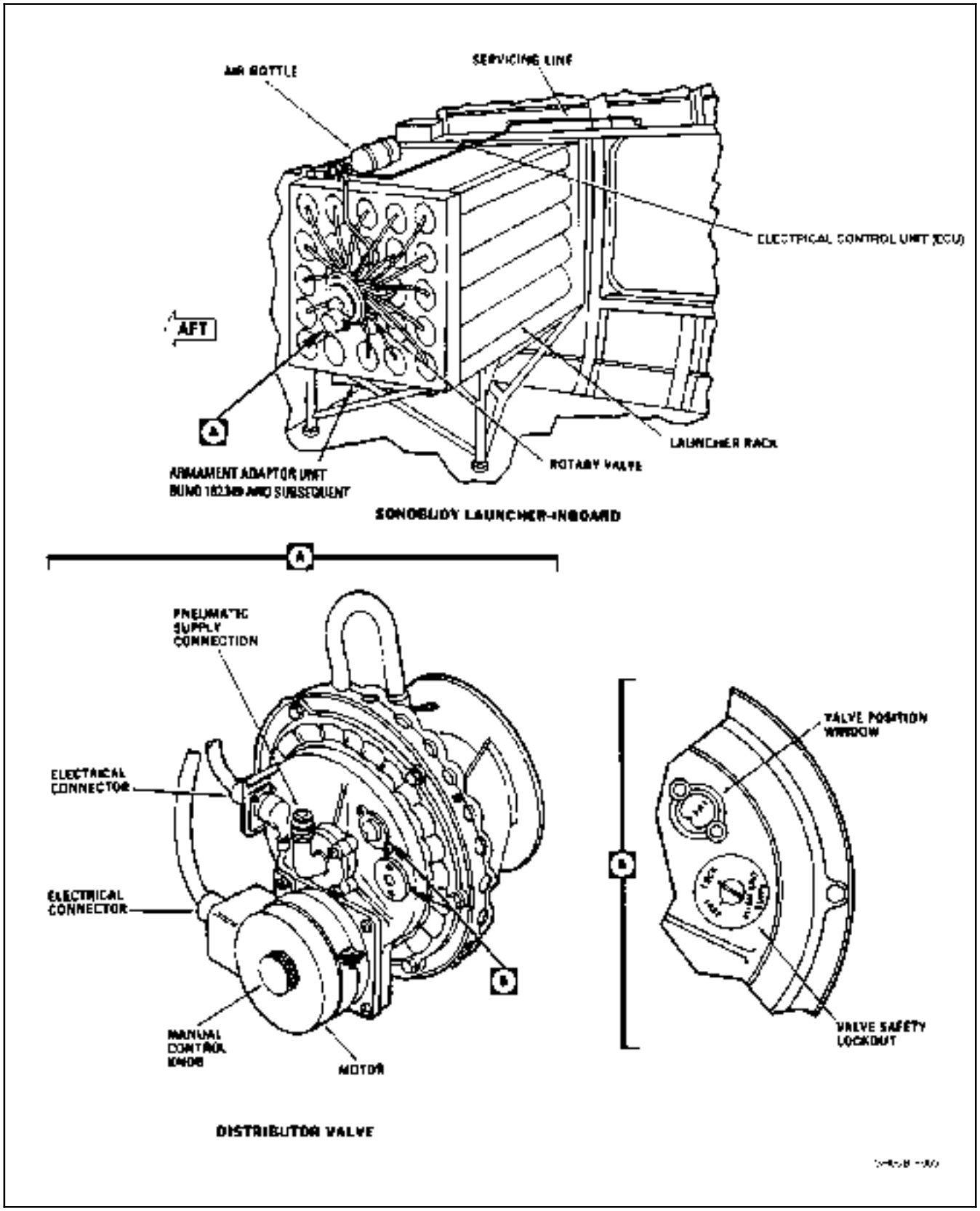


Figure 3-5. Sonobuoy Launch System Components and Servicing

3.7 WINDSHIELD WASHER SYSTEM SERVICING

The windshield washer system is serviced by filling the reservoir, located aft of the pump and behind the pilot seat.

Note

In weather where the temperature is above 0 °C, the reservoir may be serviced with water. When operating in areas where the temperature is below 0 °C, service the reservoir with equal parts of water and isopropyl alcohol.

3.8 FIRE EXTINGUISHER SYSTEM SERVICING

Fire extinguisher bottles that have lost their charge, for any reason, shall be replaced with fully serviced units.

3.9 APU OIL SYSTEM SERVICING

The APU oil supply is in the APU gearbox oil sump. The sump–filler/oil dipstick port (Figure 3-1) is located on the left side of the gearbox housing. The APU oil level can be accurately checked only by using the dipstick.

Note

The proper level for the Turbomach APU is halfway between full and refill. Filling the APU to the full line will cause the APU to overheat easily.

3.10 EXTERNAL POWER REQUIREMENTS

The helicopter requires 115/200V, 3 phase, 400 Hz external power. The AC external power receptacle is located on the right side of the helicopter, forward of the crew door near the main landing gear. The helicopter does not have a DC external power receptacle.

The following is a partial list of external power sources which provide 115/200V, 3 phase, 400 Hz AC power:

USN	USAF	CANADIAN
NC-2A	B-10	CAN-C (Same as USN NC-5)
NC-5	B-10A	
NC-6A	B-10B	
NC-7	MD-3	
NC-7A	MD-3A	
NC-7B	M32A-10	
NC-7C	M32A-13	
NC-8A		
NC-10		
NC-10B		
NC-12		
NC-12A		

3.11 AIRCRAFT TOWING

Due to the top–heavy configuration of the helicopter, precautions must be observed during all helicopter movements to prevent possible damage and dangerous conditions. The helicopter shall be moved with a tractor equipped with an SH–60 unique tow bar. Towing equipment (Figure 3-6) shall be operated only by qualified personnel who will be responsible for checking the approved towing couplings before towing. When towing a helicopter, three wingwalkers and a qualified brakerider shall be used. A wingwalker shall be stationed on each side of the helicopter, and one will be located near the tail rotor to ensure adequate clearance. In addition, towing shall be supervised by a director. Each person shall be equipped with a whistle. All stop signals shall be given by a whistle and hand signals. Whistle signals should be supplemented by hand signals whenever possible. Wheel brakes shall be applied as soon as a stop signal is received from the director.

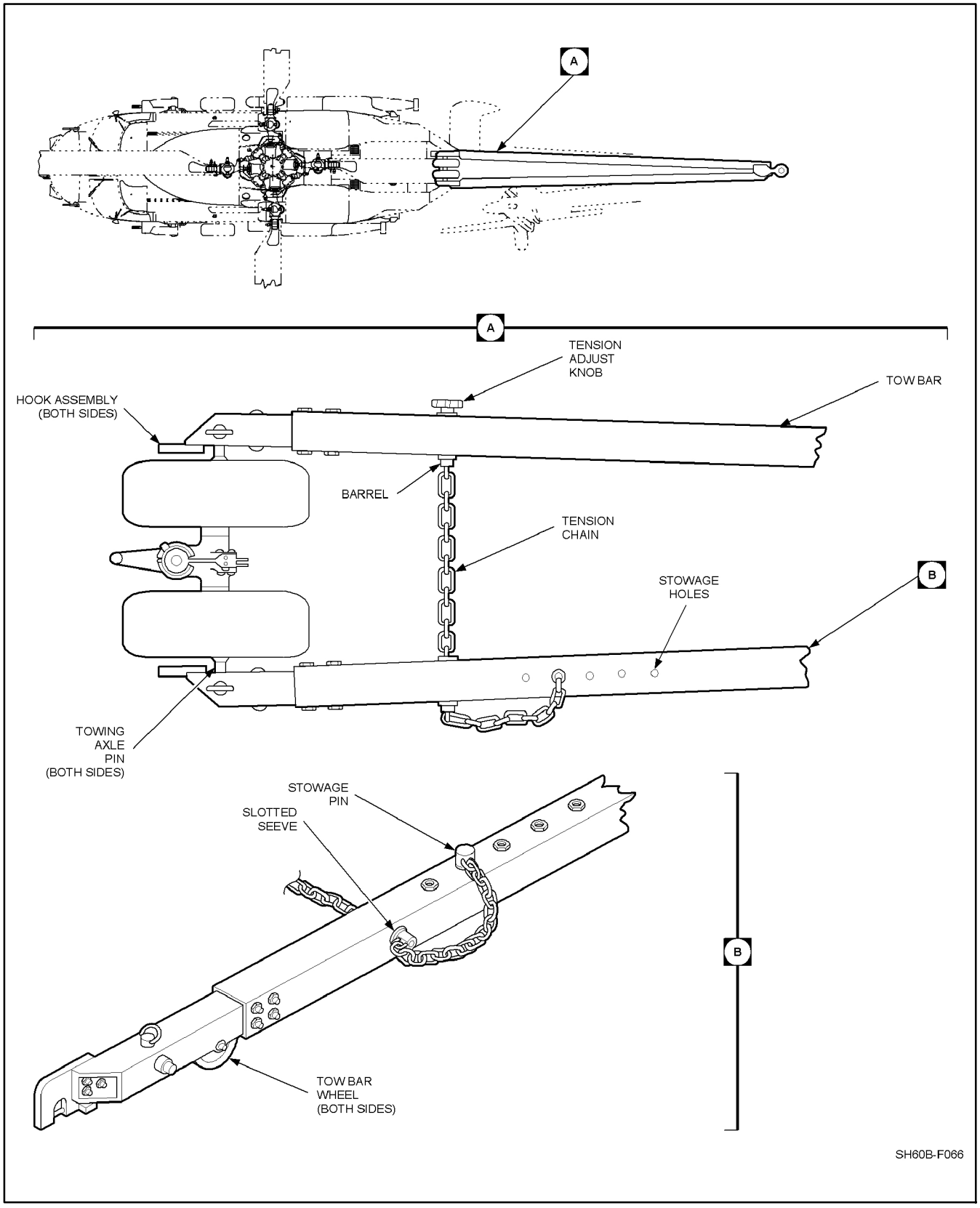


Figure 3-6. Aircraft Towing

WARNING

- Personnel shall position themselves abeam the mainmount at a distance greater than their personal height. Personnel shall never position themselves in line with the tires.
- Only essential personnel shall remain in an aircraft during ground movement. All such personnel shall be seated with seatbelts fastened. Personnel shall not enter or exit aircraft during movement.
- Towing speeds shall not be over 5 mph, and sudden stops and starts shall be avoided.
- When the tow bar is attached to the tail wheel, the tail wheel should be unlocked to prevent shearing of the lockpin.
- If pushing the aircraft up or pulling it down a short/steep incline, the nose may pitch up and cause the aft data link antenna to impact the tow bar.

3.12 PARKING

1. Short-term parking:

Note

During short-term parking, helicopter should be attended or monitored at all times.

a. Locate helicopter more than one rotor blade length from other helicopters or objects.

b. With winds 20 knots or more, park helicopter facing into the wind.

c. Lower stabilator to full-down position.

Note

Battery power may be used to lower stabilator.

d. Apply rotor brake.

e. Center tail wheel and place tail wheel lockpin in the LOCKED position.

f. Engage parking brake (handle up) and chock main wheels.

g. Install protective covers.

h. Connect low-resistance ground wire to aircraft.

2. Long-term parking:

Note

During long-term parking, helicopter will not be attended or monitored.

a. Park helicopter the same as short-term parking.

b. If winds of 45 knots or gusts to 60 knots are expected, fold and secure main rotor blades.

c. Install helicopter and main rotor tiedowns.

3.13 AIRCRAFT TIEDOWN/SECURING

3.13.1 Aircraft Tiedown Instructions

1. When possible, head helicopter into wind.
2. Chock main landing gear wheels.
3. When ground tiedown rings are not available, move helicopter to an area where anchors or deadman type anchors (capable of sustaining a 12,500 pound per cable pull test) may be used.
4. Fasten 12,500 pound pull test chain to tiedown rings (Figure 3-7) and extend outward to round mooring points at 45° angles. Provide enough slack in chain or rope between anchor and tiedown ring to prevent tightening due to distortion or tire deflation on the opposite side.

CAUTION

Hellfire missile seeker covers should be installed (when available) before commencement of ground operations and all chocks and chains operations. Exercise extreme care when applying chocks and chains to the port mainmount to avoid damage to missile seeker or fins.

5. Install protection covers and plugs.
6. When main rotor blades are spread, engage rotor brake and install blade tiedowns.
7. After winds have subsided, check helicopter for damage from flying objects and buffeting.

3.13.1.1 Aircraft Tiedown Requirements

Aircraft tiedown requirements are divided into three categories as follows:

WARNING

Deviating from a prescribed tiedown configuration is not authorized, as deviations may lead to oversight of tiedown removal, which may result in an attempt to launch with tiedowns attached. This condition may result in uncontrolled flight, dynamic rollover, or loss of aircraft and aircrew.

1. Initial Tiedown. Consists of four tiedowns, two on each main mount. This requirement exists just prior to and after shipboard aircraft movement, during shipboard aircraft startup, and immediately after landing aboard ship.
2. Permanent Tiedown. Consists of 12 tiedowns (two on each attachment point) and is required aboard ship when not at flight quarters.
3. Heavy Weather Tiedown. Consists of 18 tiedowns (three on each attachment point) and is required with weather conditions in which surface winds reach an average velocity of 35 knots or greater and/or sea state of eight feet; or wind over the deck exceeds 60 knots, pitch exceeds 4°, or roll exceeds 12°.

CAUTION

The aircraft should be moved into the hangar prior to the onset of heavy weather conditions.

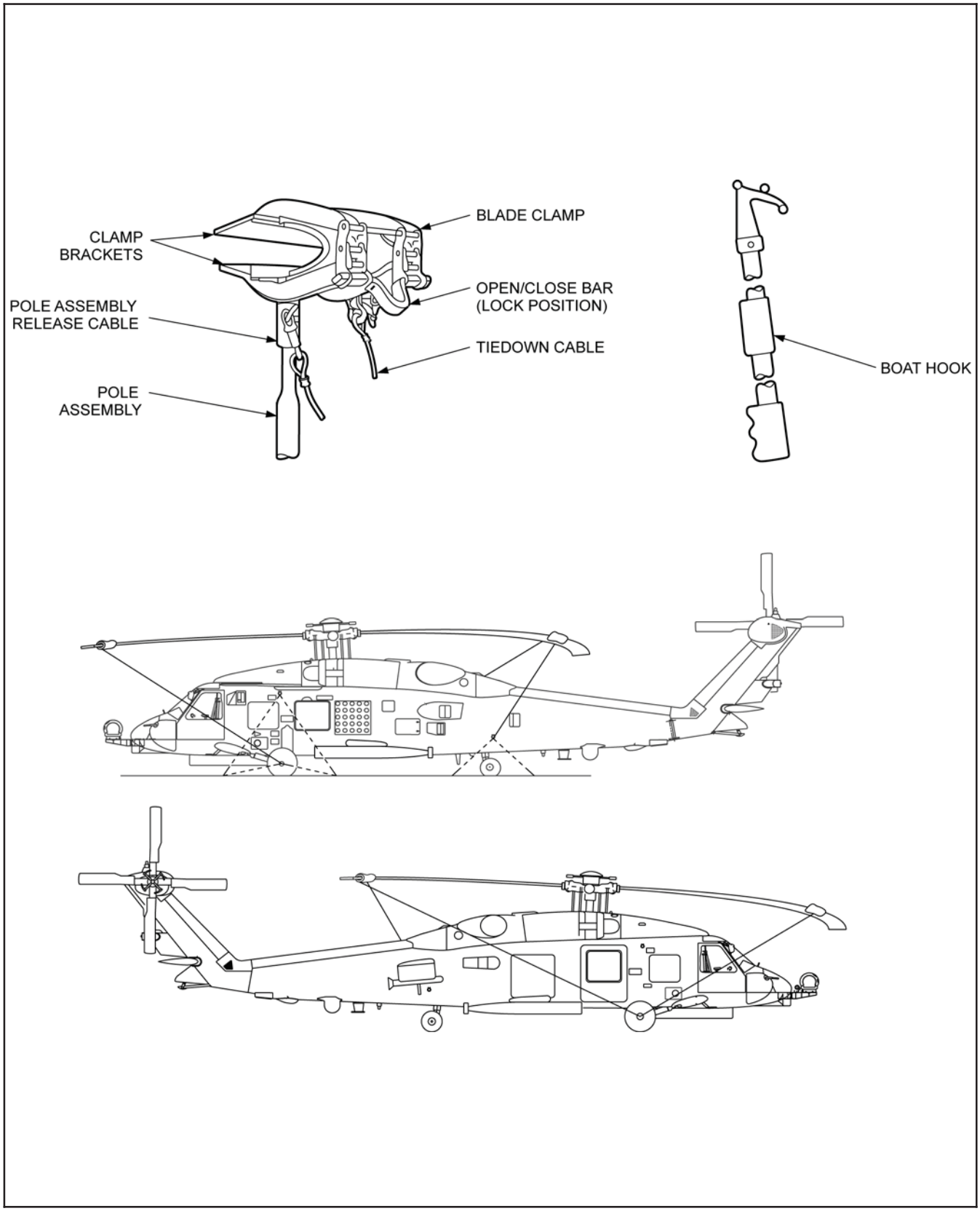


Figure 3-7. Helicopter Tiedown Fittings

3.13.1.2 Main Rotor Tiedown

To tie down the Main Rotor Blades in the spread position, do the following:

1. Attach tiedown ropes to blade clamps.

CAUTION

The use of blade boots is NOT authorized. Blade tiedowns may be used ONLY with the approved blade clamp.

2. Place blade clamps on blades approximately 2 1/2 feet inboard of the blade tip.
3. Turn rotor head to position blades to approximately a 45° angle to centerline of helicopter and engage rotor brake.

CAUTION

To prevent damage to blades, do not deflect main rotor blade tips below normal droop position when using tiedowns.

4. Attach tiedown ropes to helicopter as shown in Figure 3-7.

Note

Aft starboard rotor blade will be secured to the starboard main mount.

3.14 FUSELAGE STATIONS AND JACK POINTS

To assist in locating, dimensioning, and referring to items of structure and equipment, a system of numbering structural stations is used (Figure 3-8). Those structural stations are the number of inches from a reference datum located ahead of the nose and designated station “0.” Vertical measurements in inches are referenced to “water line” positions, again referenced to a datum below the aircraft designated “0.” Horizontal positions are also measured in inches left or right of the aircraft “butt line” (centerline), which is designated “0.” Jack pads are fittings attached to the helicopter structure which are used as jack points. There are six jack points on the helicopter: two at the tail wheel and two at each main landing gear. When landing gear jacking is required, a 5 ton minimum capacity jack shall be used. When helicopter jacking is required using the three fuselage jack points, three 12 ton minimum capacity tripod jacks shall be used.

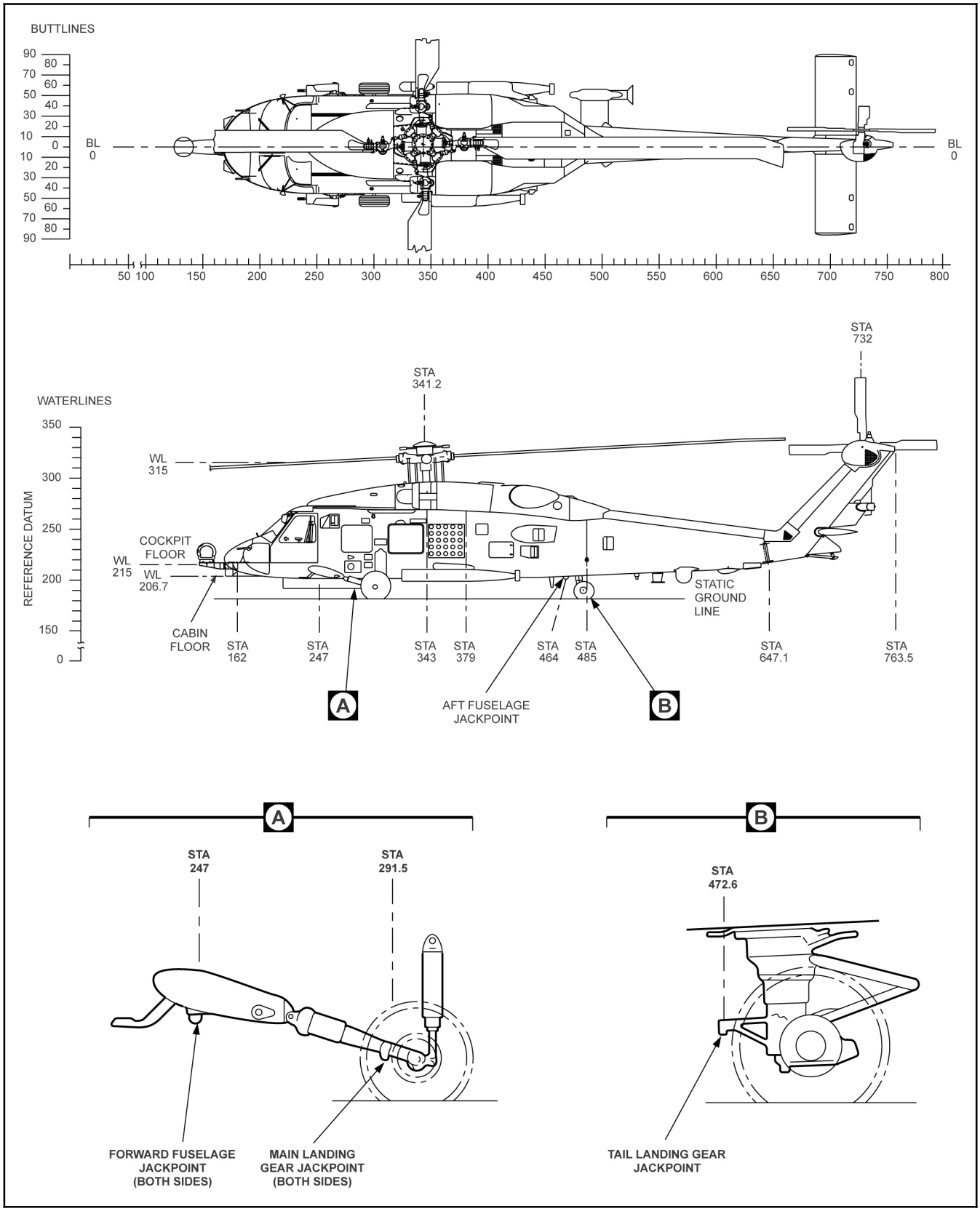


Figure 3-8. Fuselage Stations and Jack Points

CHAPTER 4

Helicopter Operating Limitations

4.1 GENERAL

This chapter covers all important operating limits and restrictions to be observed during ground and flight operations. Limitations in this part are the direct results of design analysis, tests, and operating experience. Compliance with these will allow the pilot to perform the assigned missions safely and to derive maximum use from the helicopter.

4.1.1 Exceeding Operational Limits

Any time an operational limit is exceeded, an appropriate entry shall be made on a visual discrepancy system/maintenance action form (VIDS/MAF). Entry shall state what limit or limits were exceeded, range, time beyond limits, and any additional data that would aid maintenance personnel in the inspection that may be required.

4.1.2 Instrument Range Markings

Operating limitations and ranges are illustrated by colored strips located on the instrument faces of engine, flight, and utility-system instruments (Figure 4-1). RED markings indicate the limit at which continued operation (above or below as appropriate) is likely to cause damage or shorten component life. GREEN indicates the normal or safe range of operation. AMBER markings indicate the range when special attention should be given to the operation covered by the instrument. Operation is permissible in the yellow range, but it is generally time limited.

CAUTION

Operation of the T700-GE-401C engine within the yellow light region of the VIDS may be limited to 2.5 minutes and operation below the high temperature level displayed on the VIDS may result in engine overtemperature. Operating temperature limits must be monitored on the digital readout.

Scales with green-coded light segments and amber-coded or red-coded segments above the green-coded segments operate in this manner: The segments will light in normal progression and remain on as the received-signal level increases. Those scales will go off in normal progression as the received-signal level decreases. Scales with red-coded and/or amber-coded segments below the green-coded segments operate in this manner: When the received signal is zero or on the bottom scale, the segments will light in a normal progression and will remain on. When the first segment above the red or amber range goes on, all red-coded or amber-coded segments will go off. These segments will remain off until the received-signal level indicates a reading at or within the red or amber range. At that time, all red-coded or amber-coded segments will go on and the scale display will either go on or off in a normal progression, depending upon the received-signal level. For an increasing indication, using a scale with side arrows, the following applies: When the first segment for which there is an associated side arrow lighting lights, the corresponding side arrow also lights. As the segments go on, the corresponding arrows will also go on, one at a time. Only the side arrow associated with the highest percent indication of the corresponding scale will be on.

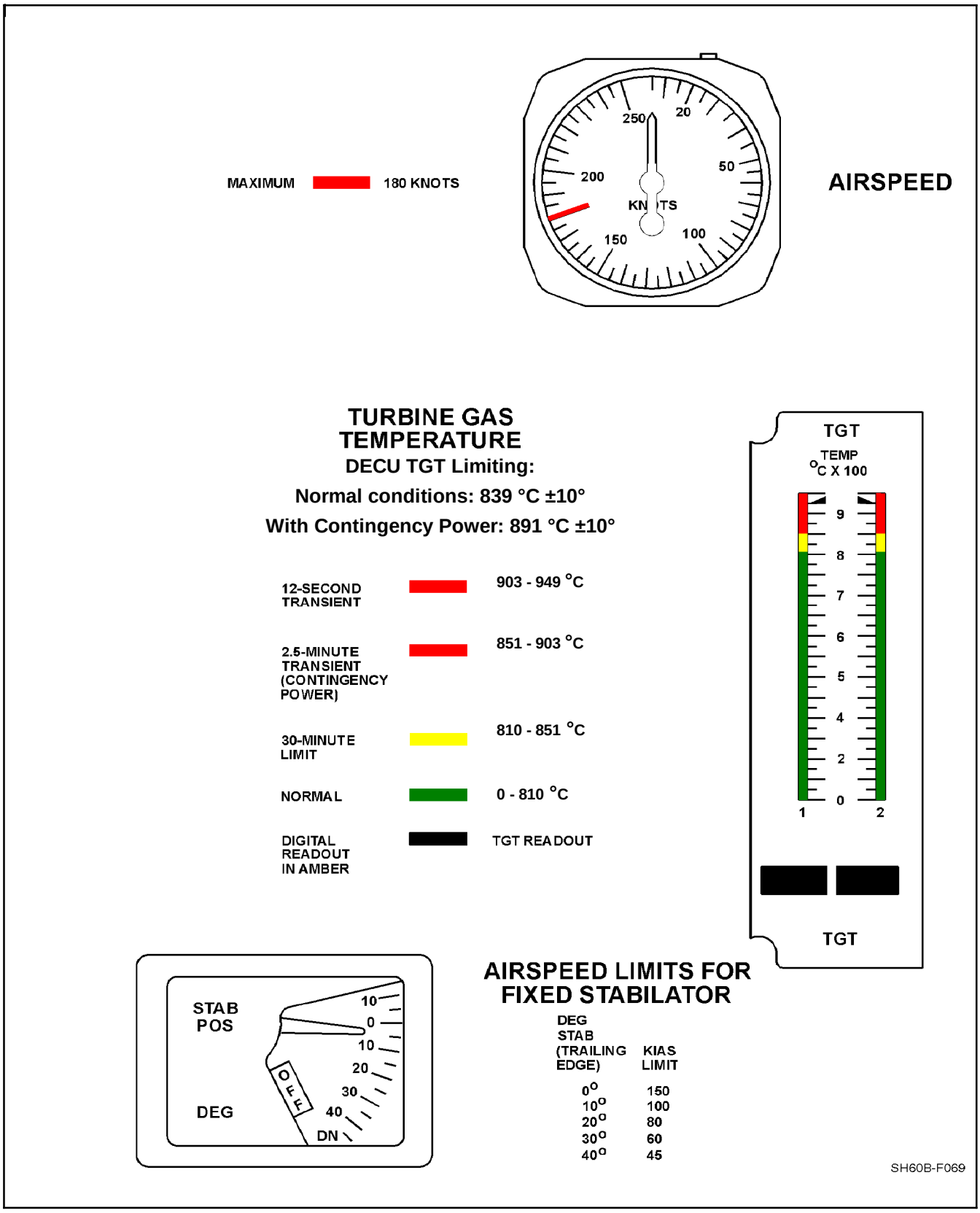


Figure 4-1. Instrument Range Markings (Sheet 1 of 4)

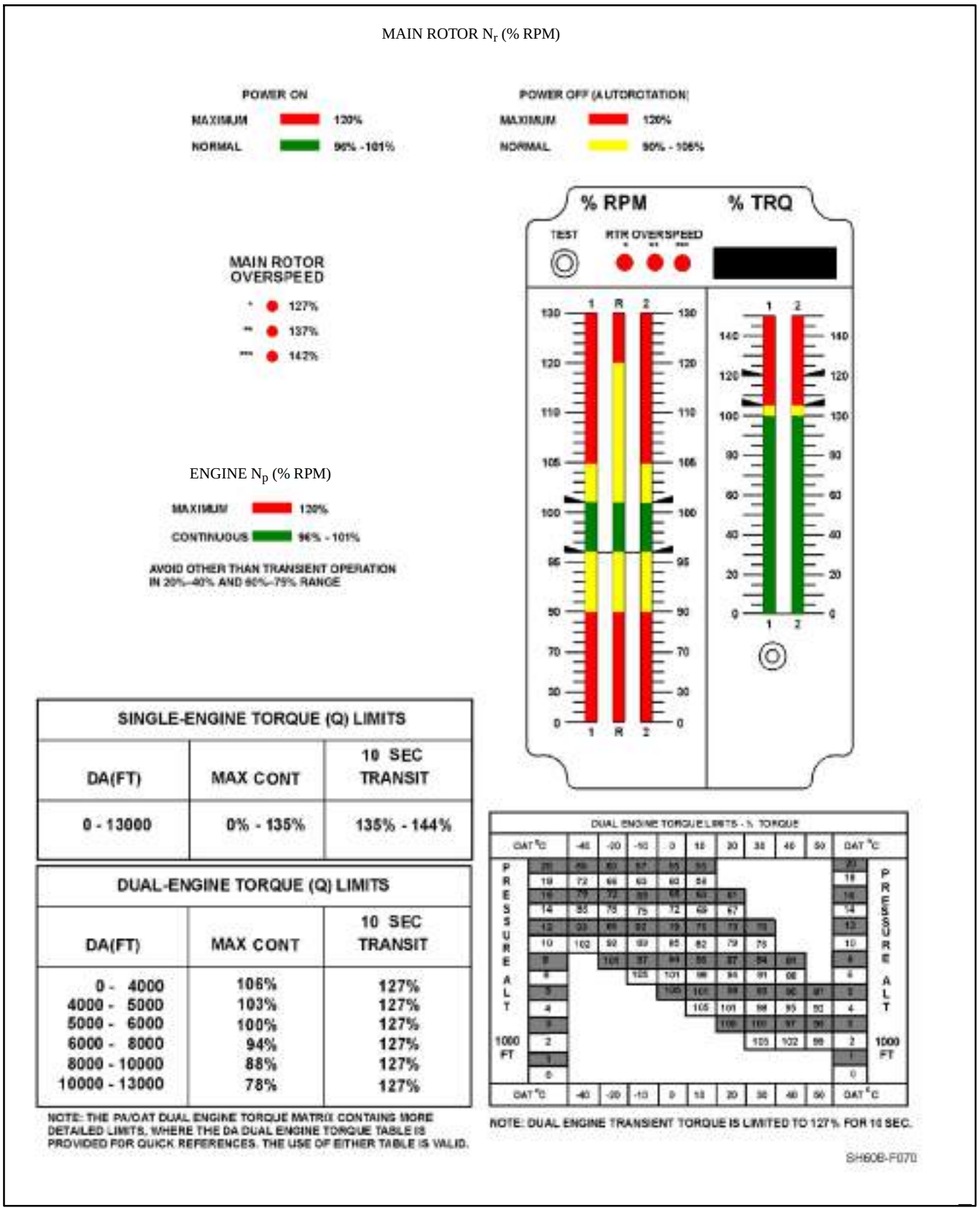


Figure 4-1 Instrument Range Markings (Sheet 2)

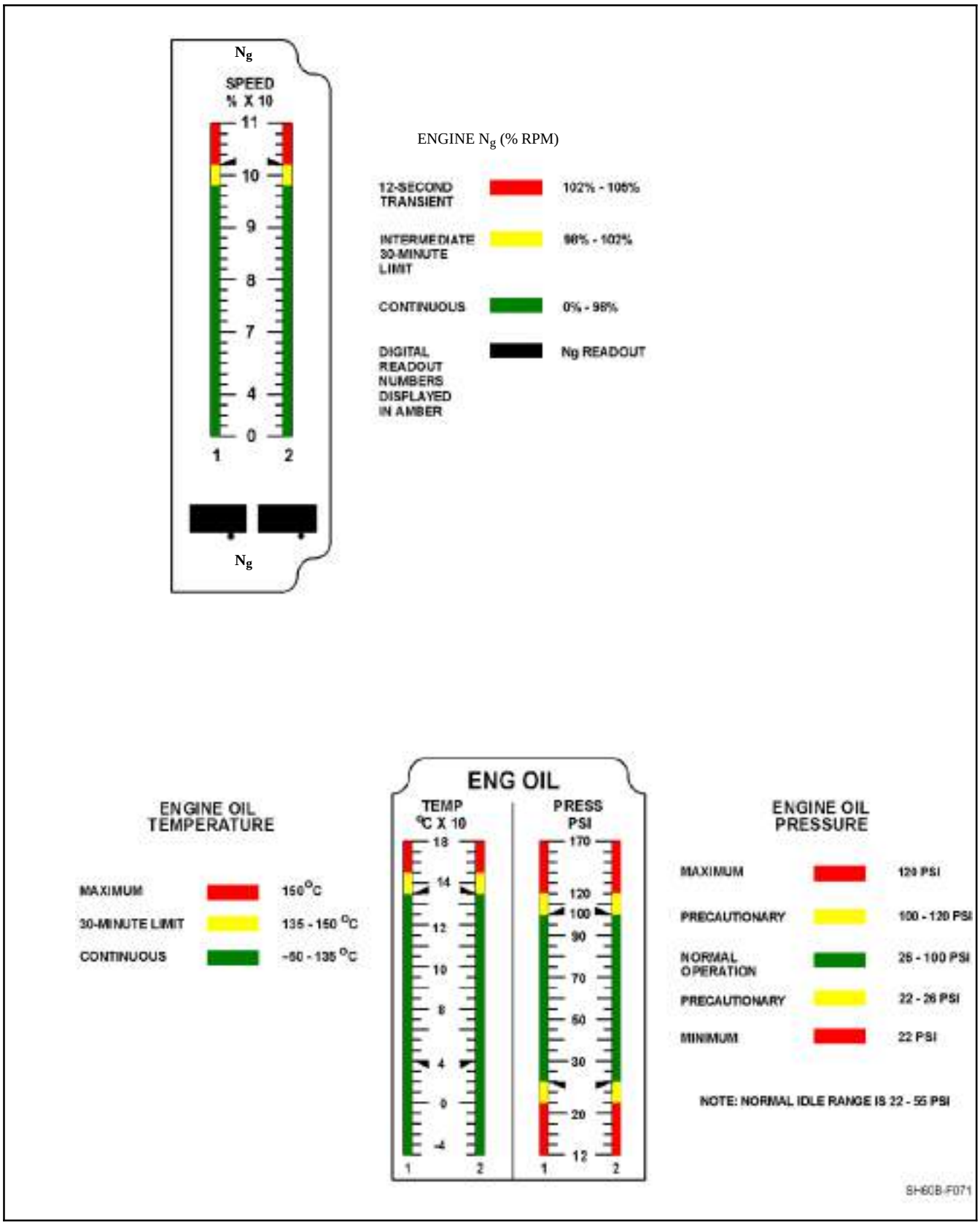


Figure 4-1 Instrument Range Markings (Sheet 3)

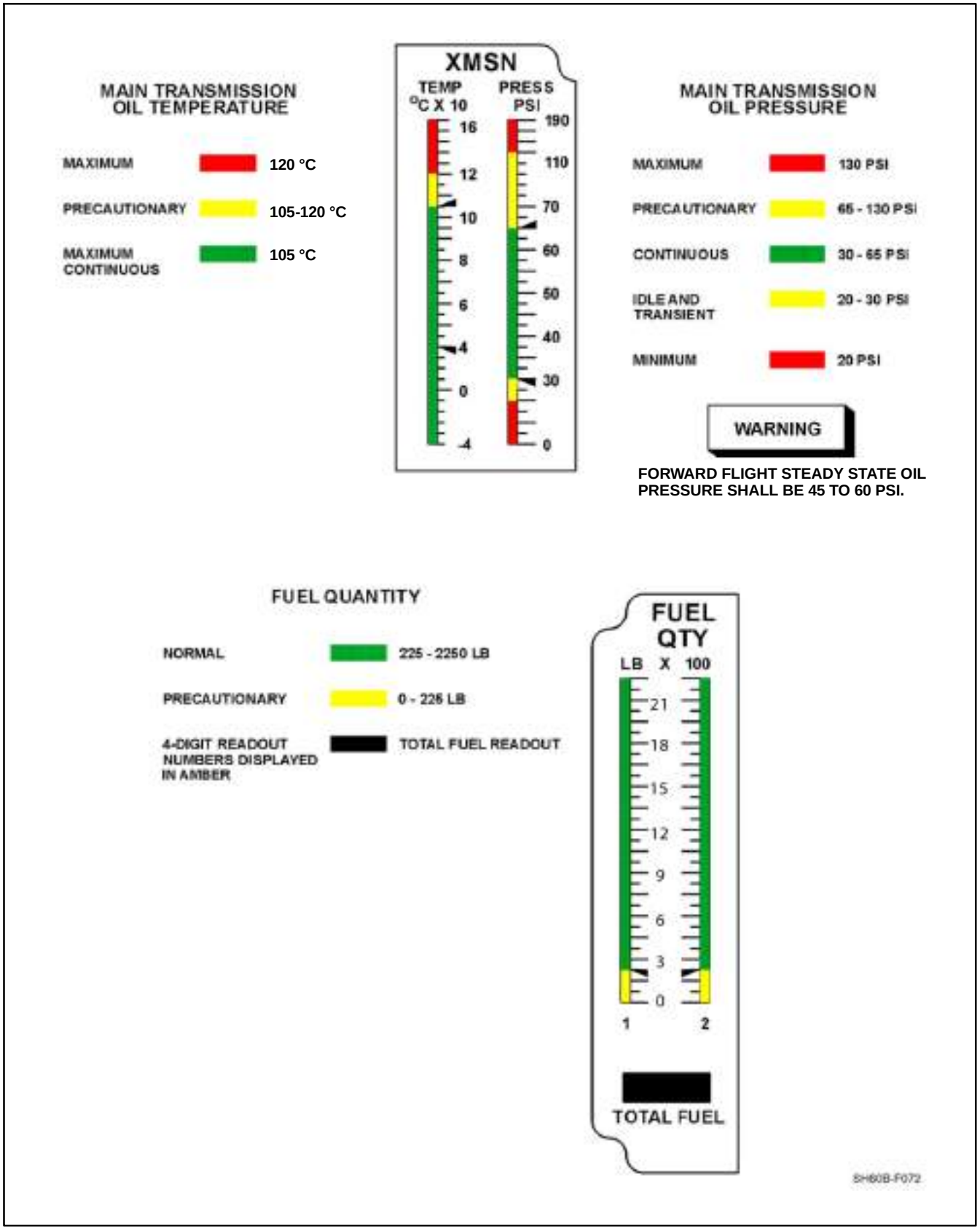


Figure 4-1 Instrument Range Markings (Sheet 4)

4.2 SYSTEM LIMITATIONS

4.2.1 Engine Limits

Limits presented in Figure 4-1 represent absolute limitations, regardless of atmospheric conditions. For variations in power available with temperature and pressure altitude, refer to Figures 4-4, 4-5, and 4-6.

4.2.2 Engine Temperature Limitations

1. Refer to Figure 4-1 for limitations.
2. The following situations can result in overtemperature:
   a. Advancing ENG POWER CONT lever to IDLE with TGT above 80 °C.
   b. Starter dropout prior to reaching lower starter cutout speed of 52 percent N_g.
   c. Operation in DECU LOCKOUT.
   d. Crossbleed starts with less than 90 percent N_g on operating engine.
   e. Compressor stalls.

4.2.3 Engine Starter Limits

A start cycle is defined as starter initiation, acceleration of the output drive, and starter dropout. The 60-second delay between start attempts is required any time a start is aborted, except in emergencies. The engine starter limits as shown in Figure 4-2.

AMBIENT TEMPERATURE (°C)	STARTER ON	STARTER OFF
LESS THAN 16	First Cycle	60 Seconds
	Second Cycle	60 Seconds
	Third Cycle	60 Seconds
	Fourth Cycle	30 Minutes
16 TO 52	First Cycle	60 Seconds
	Second Cycle	30 Minutes
ANY TEMPERATURE	2 Minutes	5 Minutes
(MOTORING/IGNITION OFF)	2 Minutes	30 Minutes
Note		
Times for motoring are cumulative times within a 5-minute period.		

Figure 4-2. Engine Starter Limits

4.2.4 Engine Start Limits

1. Single-engine starts using APU source may be attempted within the ambient conditions shown in Figure 4-3. When crossbleed starts are attempted, the operating engine must be operating at or above 94 percent N_g and rotor speed must be 99 to 101 percent N_r. Dual-engine starts using APU source may be attempted when within the range of outside air temperature (OAT) and pressure altitude of Figure 4-3.
2. Engine start with main rotor blades or tail pylon folded is prohibited.

4.2.5 Engine Idle Limits with Gust Lock Engaged

Engine operating with gust lock engaged is prohibited.

4.3 TRANSMISSION AND ROTOR LIMITS

4.3.1 Main Transmission Module Limitations

The transmission is limited in rpm, torque, oil pressure, and temperature. Operation is governed by whichever is reached first. If transmission oil pressure and/or temperature is in the precautionary range (amber), the helicopter shall not be scheduled for additional flights until maintenance action is taken. (Refer to Figure 4-1 for limitations.)

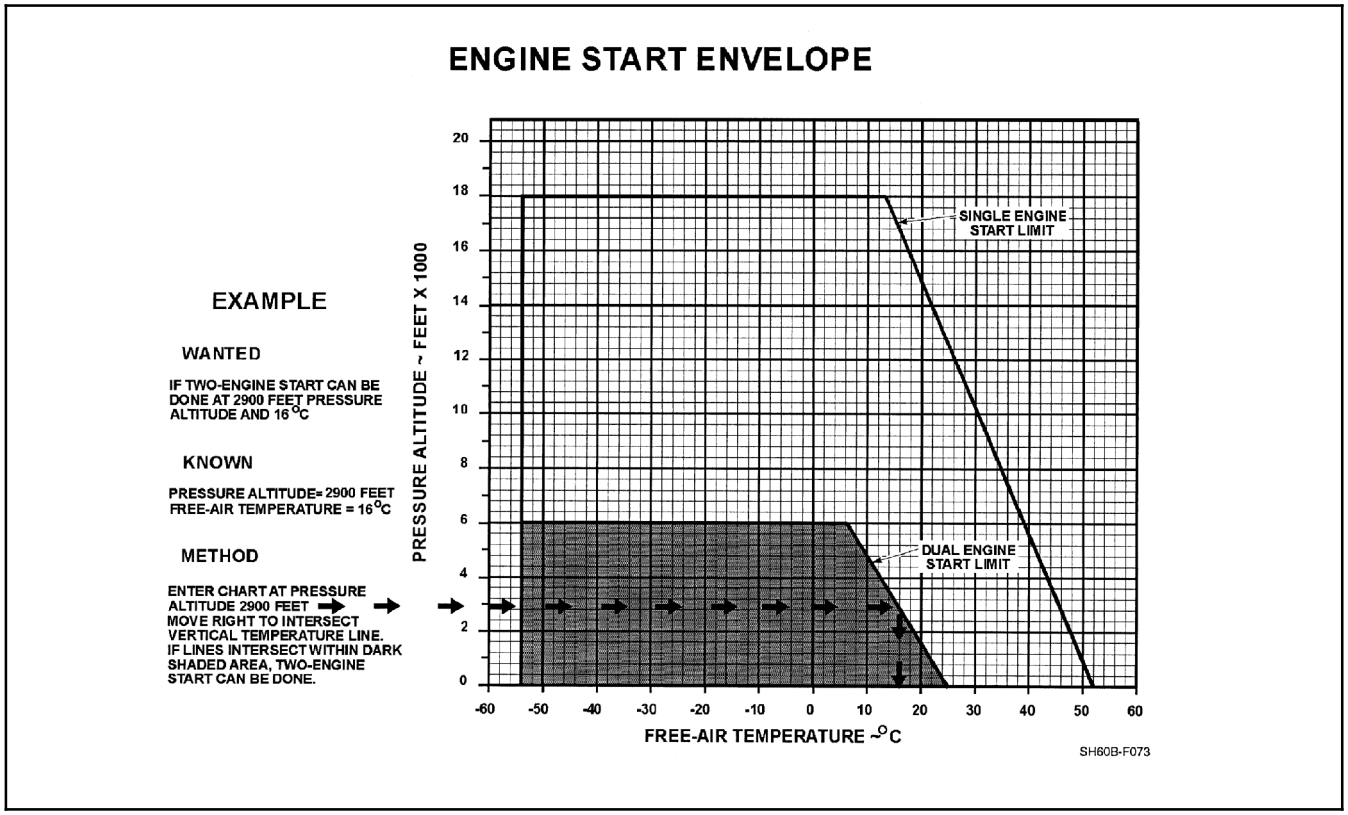


Figure 4-3. Engine Start Envelope

Main gearbox torque limitations for maximum service life under steady-state conditions are indicated by the range markings on the torquemeter; however, transient conditions in excess of the red line may occur during normal operations. Main gearboxes operated in excess of limits must be inspected by an overhaul facility.

A transient condition is herein defined as a temporary torquemeter reading above red line. Unless otherwise indicated, all torques referred to are matched engine torques.

Note

Prolonged hovering flight in hot weather 95 °F (35 °C) and higher gross weight may cause temperatures to rise in the yellow precautionary range. Hovering operations in the precautionary range for less than 30 minutes in any one flight under those conditions is considered normal.

4.3.2 Transmission Oil Pressure Limitations

Momentary fluctuations in transmission oil pressure may occur during transient maneuvers (i.e., pitch pulse during normal hover to check AFCS response or hover in gusty wind conditions), autorotations, or steady noseup hover. These fluctuations, including momentary drops into the yellow (below 30 psi), and transient drops not to exceed 1 second below 20 psi, are acceptable. The main transmission may be operated up to 30 minutes at a time with pressure fluctuations when the aircraft is known to be in a noseup attitude (slope landings or hover with extreme aft cg). In forward flight steady-state conditions, the transmission pressure shall be in the 45 to 60 psi range; fluctuations or pressure below 45 psi under these conditions requires maintenance action.

4.3.3 Rotor Start and Stop Limits

Maximum wind velocity for rotor start or stop is 45 knots from any direction.

4.3.4 Rotor Overspeed

All rotor overspeeds in excess of 120 percent N_r shall be reported on VIDS/MAF. (Refer to Figure 4-1 for additional overspeed limits.)

4.4 AERODYNAMIC LIMITATIONS

4.4.1 Airspeed Operating Limits

The maximum (redline) airspeed limit is 180 KIAS. Figure 22-3 presents the maximum airspeed as limited by blade stall. Other airspeed limits are:

1. Maximum airspeed for autorotation is 100 KIAS.
2. Maximum airspeed with one engine inoperative is 150 KIAS.
3. Sideward/rearward flight limit is 35 knots.
4. When stability augmentation system SAS-1 and SAS-2 are inoperative in instrument meteorological conditions (IMC), the limit is 125 KIAS.
5. When two hydraulic systems are inoperative in IMC, the limit is 125 KIAS.
6. Boost servo off limit is 140 KIAS in VMC, 125 KIAS in IMC.
7. Opening or closing cabin door limit is 60 KIAS.
8. Operation of windshield wipers limit is 130 KIAS.

CAUTION

At airspeeds of 130 KIAS and above, wipers can freeze in position with motor running, even in heavy precipitation. This condition can result in overheating of the wiper motor presenting a possible fire hazard.

4.4.2 Controllable Searchlight Airspeed Limits

1. When the searchlight is fixed in any position other than stowed, maximum forward airspeed is limited to 160 KIAS.
2. The maximum forward airspeed to move the searchlight is 100 KIAS.

4.4.3 Minimum Height for Safe Landing After Single- or Dual-Engine Failure

The Height-Velocity diagrams (Figure 4-4) show the combinations of speed and wheel height that should be avoided during normal operations to provide for safe landing if single- or dual-engine failure should occur.

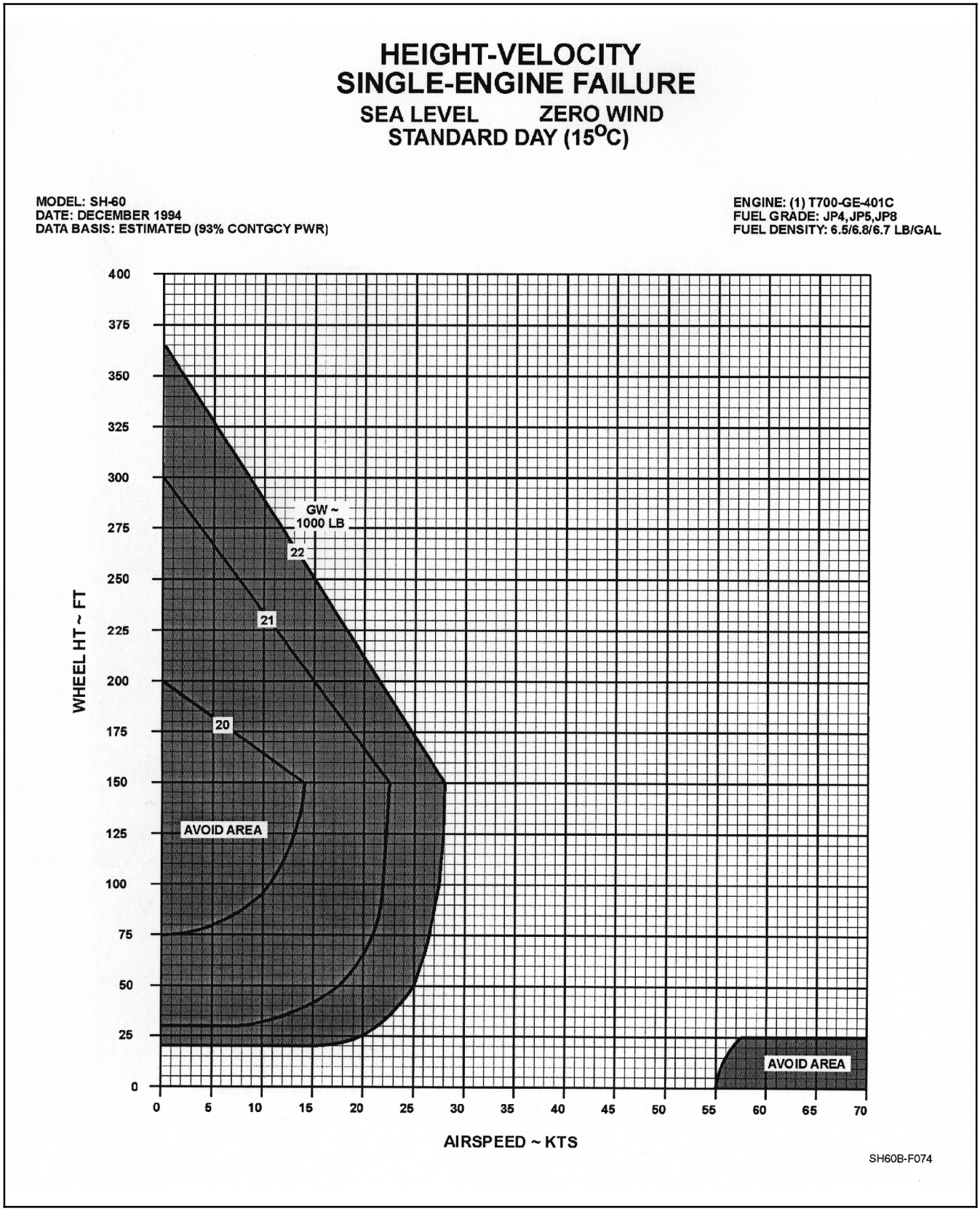


Figure 4-4. Height-Velocity Diagrams (Sheet 1 of 3)

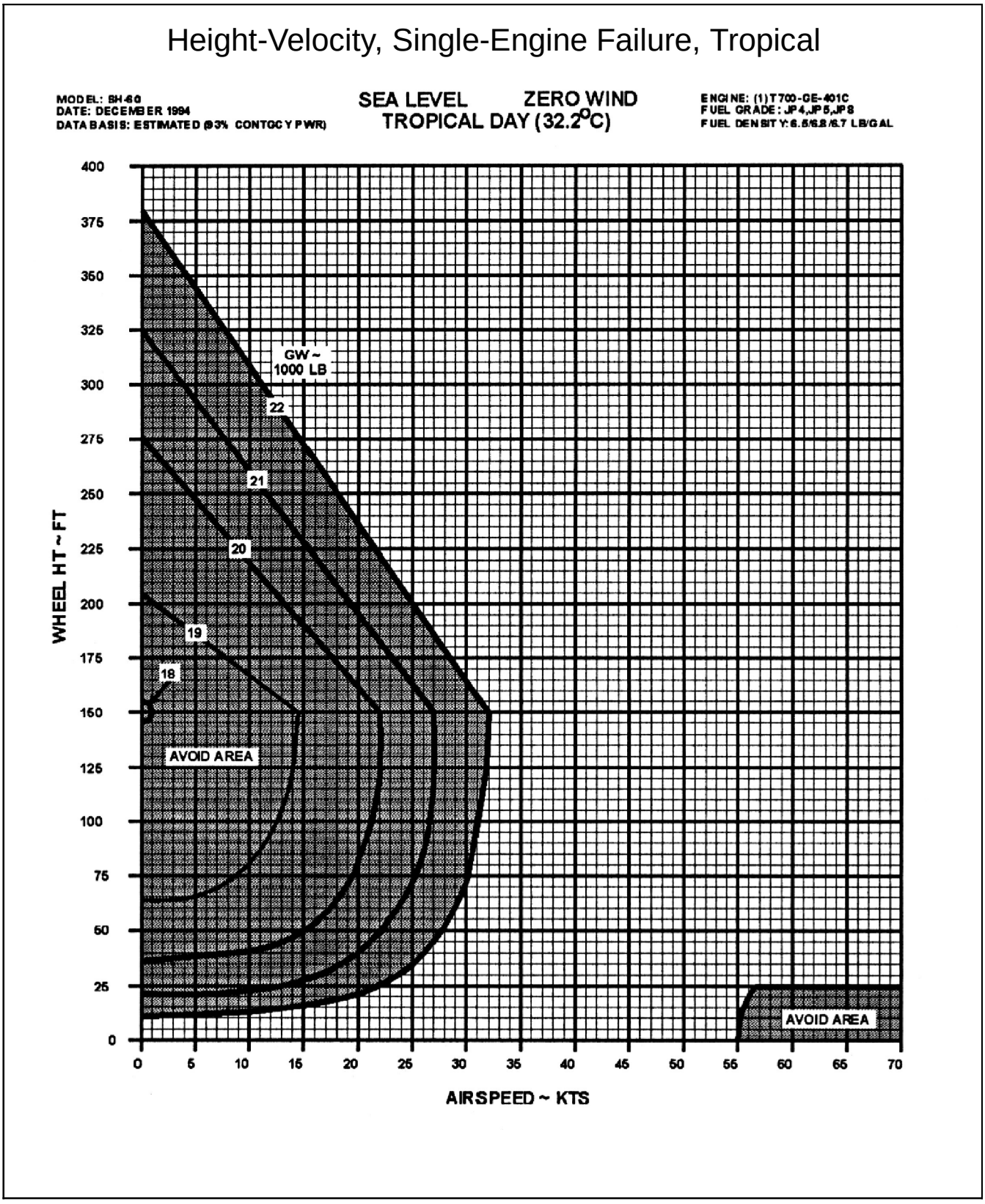


Figure 4-4. Height-Velocity Diagrams (Sheet 2)

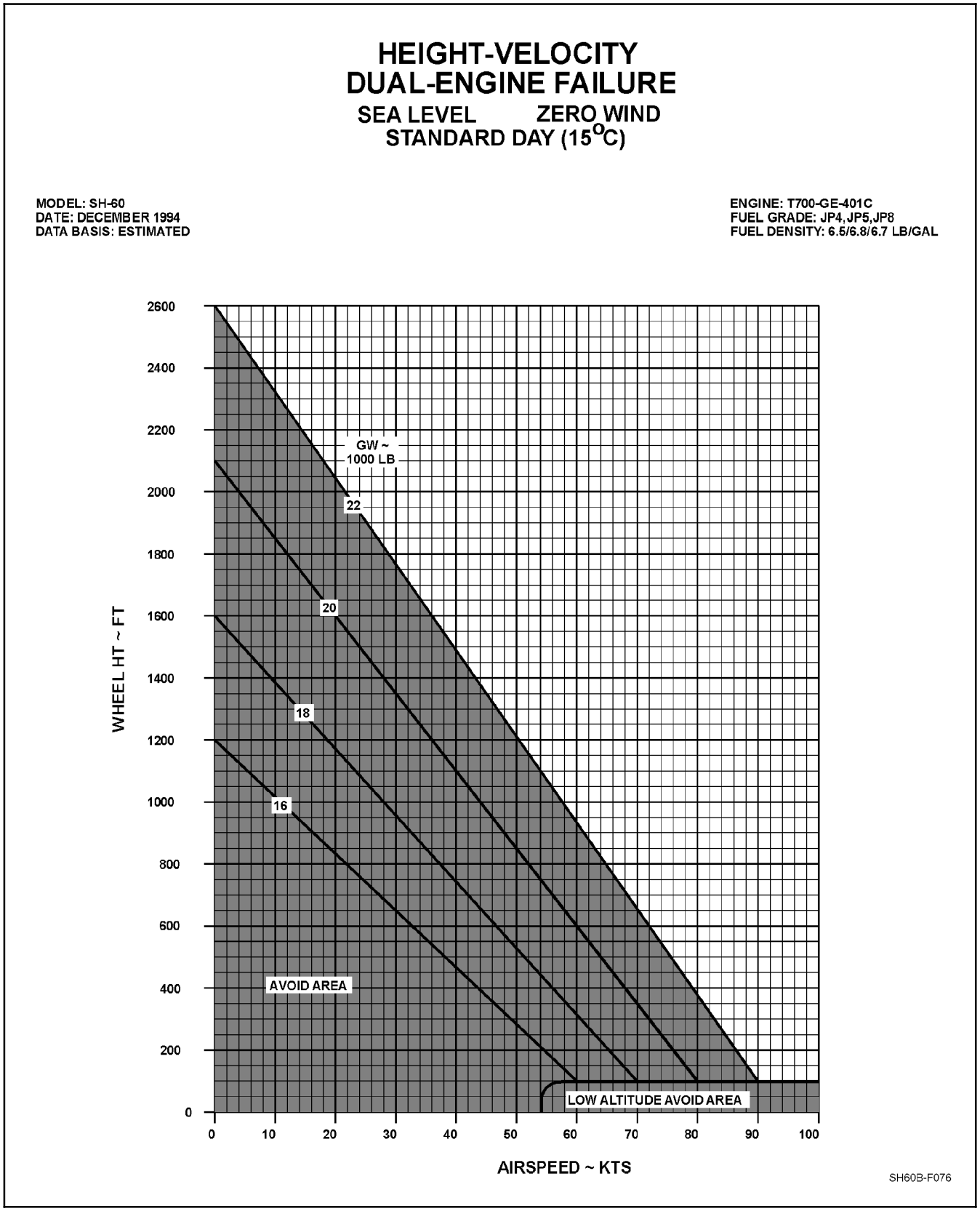


Figure 4-4. Height-Velocity Diagrams (Sheet 3)

4.4.4 Autorotation

The Autorotation Chart (Figure 4-5) provides rates of descent and glide ratio in nautical miles per 1,000 feet of altitude loss. Airspeeds for maximum glide distance, maximum glide time, minimum rate of descent, and maximum allowable autorotation airspeed can be extracted from this chart.

4.5 MANEUVERING LIMITATIONS

Main rotor blade stall is indicated by an increase in 4-per-revolution vibrations and shall be avoided by adhering to the Airspeed for Onset of Blade Stall Chart (Figure 22-3). This chart is valid only within the guidelines of blade stall, Chapter 11.

4.5.1 Limitations for Maneuvering with Sling Loads

Refer to Figure 4-6.

4.5.2 Limitations for Maneuvering with Rescue Hoist Loads

Maneuvering limitations with a rescue hoist load are limited to a maximum of 20° angle of bank in forward flight (Figure 4-6). Sideward flight is limited by bank angle and is decreased as airspeed is increased. Rate of descent is limited to 1,000 feet per minute.

4.5.3 Bank Angles Limitation

Bank angles shall be limited to a maximum of 45° in normal operations, 30° when one PRI SERVO PRESS or BOOST SERVO OFF caution light is on, or above 10,000 feet density altitude.

4.5.4 Hovering

Prolonged rearward flight and downwind hovering should be avoided to prevent accumulation of exhaust fumes in the helicopter and heat damage to window on the open cargo door. Prolonged hovering in 20-knot, right-side wind should be avoided.

4.5.5 Altitude Limitation

Maximum operating density altitude is 13,000 feet.

4.5.6 Prohibited Maneuvers

The following maneuvers are prohibited:

1. Aerobatic flight (e.g., rolls, loops, inverted flight).
2. Abrupt movement of the flight controls.
3. Bank angles greater than 45°.
4. Hovering turns at a rate in excess of 30° per second.
5. Practice full-autorotation landings.
6. Practice autorotation descents below 500 feet AGL and less than 40 KIAS over unprepared or rough terrain.
7. Intentional approaches to or inducement of retreating blade stall.

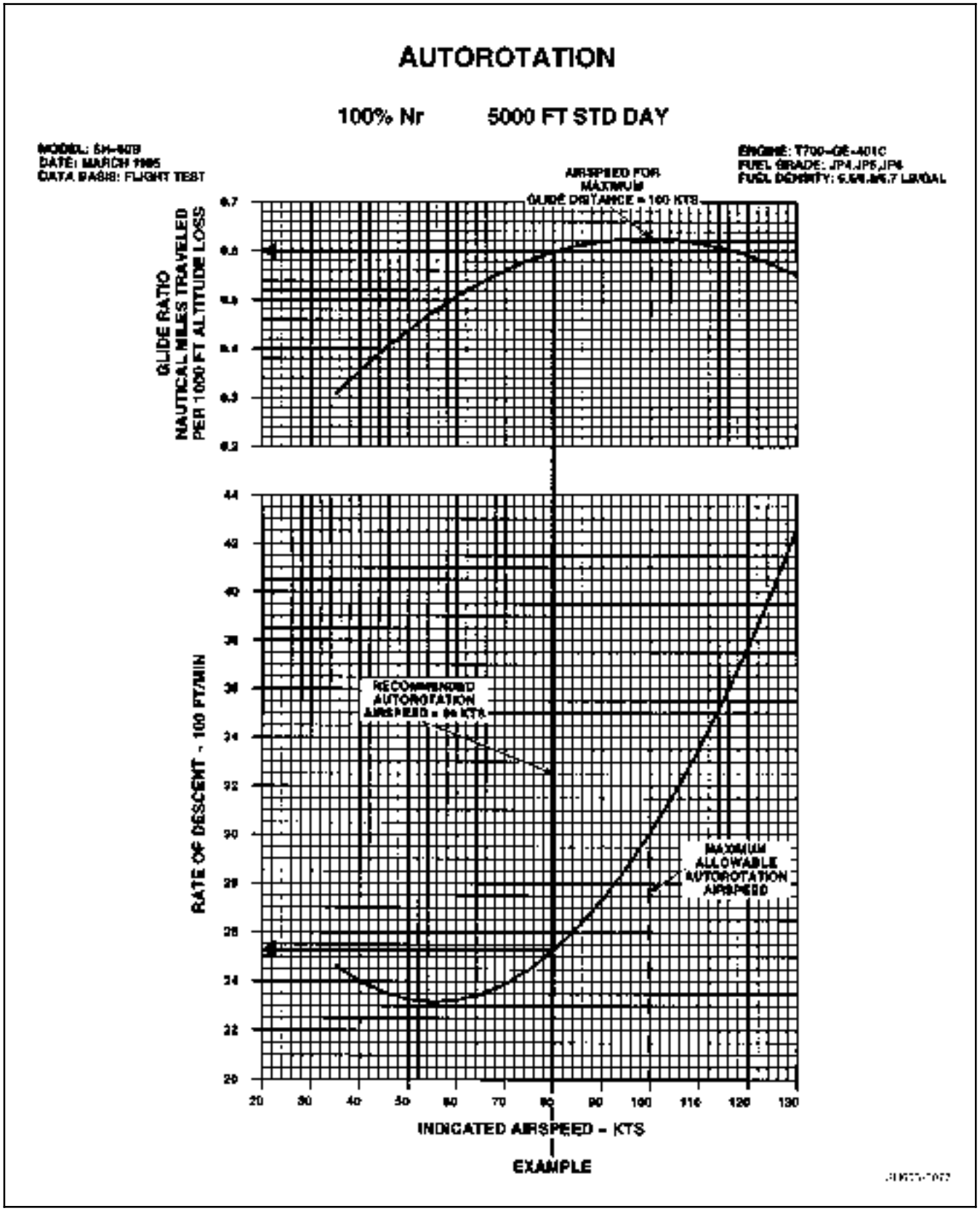


Figure 4-5. Autorotation

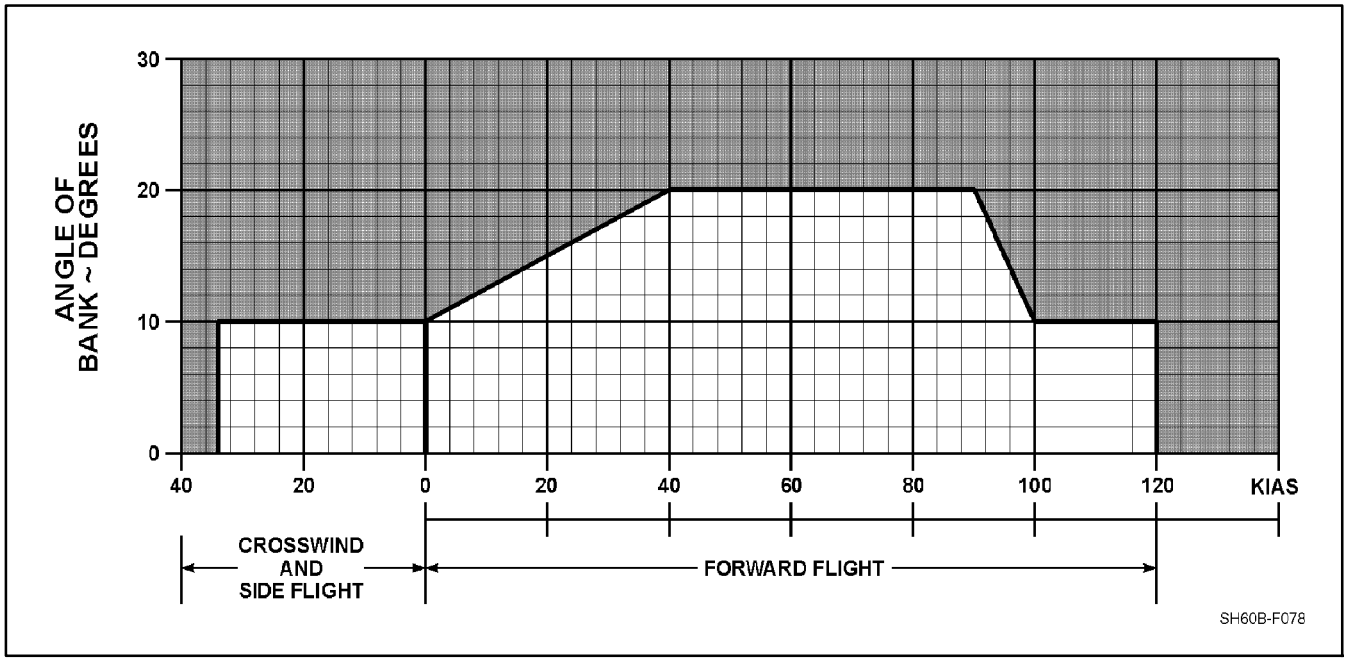


Figure 4-6. Sling/Rescue Hoist Load Maneuvering Limits

4.6 MISCELLANEOUS LIMITS

4.6.1 MAD Reeling Machine Operating Limits

The reeling machine duty cycle is 2 minutes operating and 15 minutes nonoperating.

1. MAD envelope:
   a. Altitude: 200 feet AGL minimum
   b. Deployment (cable payout):
   Climb — 1,000 fpm; Descent — 0 fpm
   Bank Angle — 0°
   Airspeed — 40 to 90 KIAS.
2. Retrieval/docking:
   a. For up to last 12 feet of cable: 40 to 90 KIAS in level flight. For last 12 feet of cable: 50 to 55 KIAS in level flight.
3. At full trail position:
   a. Straight and level — 40 to 150 KIAS.
   b. Level turns — Up to 45° angle of bank and between 40 to 120 KIAS.
   c. Descents — 80 to 100 KIAS at up to 2,400 fpm.
   d. Climbs — 80 to 100 KIAS up to max climb rate.
4. Recommended jettisoning profile — Straight and level, 0 to 60 KIAS.

4.6.2 Stores Limits

1. Release of the Mk 46 Torpedo (Mod 5, 5A, and 5A(S)) from the starboard pylon when the MAD is deployed is restricted to 80 KIAS.
2. Do not exceed the maximum sonobuoy launcher load weight of 800 pounds.

3. Minimum altitude for employment of sonobuoys is 100 feet AGL below 100 knots, or 150 feet AGL above 100 knots.
4. Minimum pressure to jettison all sonobuoys is 900 psi.

4.6.3 Rotor Brake Operating Limits

Maximum rotor speed for rotor brake application is 76 percent N_r. Routine rotor stops shall be done between 30 percent and 50 percent N_r. Routine rotor brake stops should be limited to 180 psi for extended rotor brake life.

4.6.4 Blade, Pylon/Stabilator Fold or Spread

Blades should not be folded or spread in winds of over 45 knots from any direction. Allow a 10-minute cooling period between a blade fold and spread evolution before recycling the blade-fold motors. Tail pylon/stabilator fold and spread operations are limited to a maximum windspeed of 45 knots.

4.6.5 Landing Limitations

Downwind landings should be avoided. Water landings are not permitted, except in an emergency. The following limitations apply:

1. Maximum rate of descent (sink rate) for level terrain shall not exceed 720 fpm (12 ft/s).
2. Maximum rate of descent for sloped terrain shall not exceed 360 fpm (6 ft/s).
3. Maximum forward touchdown speed shall not exceed 75 knots groundspeed, tail wheel locked, 20 knots with tail wheel unlocked.
4. Landing gear limitations: Maximum ground taxi speed is limited to 40 knots with aircraft equipped with tail gear shimmy damper, 20 knots for aircraft without shimmy damper.
5. Slope landing limitations: The following apply regardless of gross weight or cg:
   a. 9° noseup slope
   b. 6° nosedown slope
   c. 12° cross slope.

4.6.6 Shipboard Wind Limitations

Wind limitations for shipboard operation are defined in the Pilot's Pocket Checklist (NAVAIR Al-H60BB-NFM-500) and Helicopter Operating Procedures for Air-Capable Ships NATOPS Manual NAVAIR 00-80T-122.

4.6.7 Emitter Hazard and Standoff Distances

See Chapter 8 for emitter hazards and standoff distances.

4.7 WEIGHT LIMITATIONS

4.7.1 Weight Limits

The maximum gross weight of the helicopter is 21,700 pounds. The maximum gross weight internal load limit is 20,800 pounds. Maximum cargo floor loading is 225 pounds/square foot.

4.7.2 Center of Gravity Limitations

To ensure adequate control, the helicopter shall be loaded so that the center of gravity is between stations 346.8 and 364.0. Above 19,462 pounds gross weight, the center of gravity station limitations decrease with increasing weight. For a chart of these limitations and information on how to determine the center of gravity for any load condition, refer to the Weight and Balance Manual (NAVAIR 01-1B-40).

4.7.3 Cargo Hook Weight Limitation

The maximum weight that may be suspended from the cargo hook is limited to 6,000 pounds.

4.7.4 Rescue Hoist Weight Limitations

The maximum weight that may be suspended from the rescue hoist is 600 pounds.

4.8 MINIMUM EQUIPMENT

An MPD should be installed and functional at the sensor operator's station for the following operations and/or environments:

1. Unaided night flights without a visible horizon.
2. Any shipboard environment or operation.
3. AH/DM flights.

4.8.1 Minimum Equipment for Passengers

Flight without a functional seat for each occupant is prohibited, except in emergency situations.

4.8.2 Minimum Aircraft Equipment for Flights Into Forecast or Known Icing Conditions

All installed anti-ice/de-ice equipment (windshield, engine, rotor) shall be operational prior to flight. Refer to Chapter 14 for specific information on flight in icing conditions.

Helicopters without blade de-ice equipment are prohibited from flight into icing conditions (ambient temperatures of +5 °C or below in visible moisture).

Helicopters equipped with operable anti-ice/de-ice equipment are permitted flight into forecast or known trace or light icing conditions.

WARNING

Flight into forecast or known moderate or severe icing conditions is prohibited.

4.8.3 Flight in Instrument Meteorological Conditions

The SH-60B is qualified for flight in instrument meteorological conditions (IMC).

4.8.3.1 Minimum Aircraft Equipment for Night or IMC Flight Over Land

1. Flight instruments:
   a. Pilot and ATO attitude indicators
   b. All pitot-static instruments (airspeed, vertical speed indicator (VSI), barometric altimeter (BARALT))
   c. Pitot heat
   d. One turn rate gyro
   e. Pilot and ATO turn and slip indicators
   f. One compass system
   g. Standby compass with current calibration card
   h. Radar altimeter
   i. Clock.
2. All engine and transmission instruments

3. Adequate instrument, navigation, landing, cockpit, and cabin lighting
4. Radio equipment:
   a. (1) UHF
   b. ICS, all crewmembers
   c. IFF, as required by Air Traffic Control (ATC) regulations.
5. Navigation systems:
   a. NSIU
   b. TACAN.
6. SAS-2, trim, autopilot
7. Two generators operable.

4.8.3.2 Minimum Aircraft Equipment for Night or IMC Flight Over Water

In addition to the equipment listed under paragraph 4.8.3.1, the following equipment is required:

1. One of the following navigation systems must be operable:
   a. Aircraft search radar
   b. Tactical navigation system (SAC-1)
   c. UHF/DF
   d. Shipboard air search radar
2. Doppler (night SAR only)
3. Altitude hold (RADALT or BARALT).

4.9 ENVIRONMENTAL RESTRICTIONS

4.9.1 Temperature Limitations

Operations at temperatures below –40 °C (–40 °F) or above +60 °C (+140 °F) are prohibited.

4.9.2 Engine and Engine Inlet Anti-Ice Limitations

At engine power levels of 10 percent torque per engine and below, full anti-ice capability cannot be provided, due to engine bleed limitations. Avoid operation under conditions of extreme low power requirements such as high rate of descent (1,900 fpm or greater), or ground operation below 100 percent N_r, during icing conditions.

4.9.3 Backup Hydraulic Pump Hot Weather Limitations

Operation of the backup pump, without rotors engaged, is limited when OAT is +33 °C and above as depicted in Figure 4-7. Limits do not apply to operation with rotors engaged.

OAT (°C)	OPERATING TIME (MINUTES)	COOLDOWN TIME (MINUTES)
+33 to +38	24	72
+39 and above	16	48

Figure 4-7. Backup Pump Limits

4.9.4 APU Operating Limitations

To prevent APU overheating, APU operation at ambient temperature of 43 °C and above with engine and rotor operating is limited to 30 minutes. With engine and rotor not operating, the APU may be operated continuously up to an ambient temperature of 51 °C.

PART II

Indoctrination

Chapter 5 — Aircrew Training, Qualifications, and Requirements

CHAPTER 5

Aircrew Training, Qualifications, and Requirements

5.1 FLIGHTCREW QUALIFICATIONS

5.1.1 Qualifications

All aircrew meeting the following minimum qualifications are subject to NATOPS evaluation checks in the SH-60B.

5.1.2 Waiver of Requirements

Squadron Commanding Officers are authorized to grant written waivers of flight and/or training requirements when an individual's experience warrents such action.

5.2 PILOT QUALIFICATIONS

Pilots shall be designated in writing by the commanding officer in accordance with OPNAVINST 3710.7 (series) and this manual. Pilots shall be designated using the following classifications: H-60 Pilot Qualified in Model, SH-60B Helicopter Second Pilot, SH-60B Helicopter Aircraft Commander, and SH-60B Functional Checkflight Pilot. Tactical/mission qualifications shall be attained per applicable instructions.

5.2.1 H-60 Pilot Qualified in Model

In addition to completing the requirements specified in OPNAVINST 3710.7 (series) for personnel authorized to pilot naval aircraft, an H-60 Pilot Qualified in Model (PQM) shall:

1. Satisfactorily complete an H-60 Fleet Replacement Squadron (FRS) syllabus or other CNO-approved training syllabus for qualification as an H-60 PQM.

5.2.2 SH-60B Helicopter Second Pilot (H2P)

In addition to the requirements set forth for an H-60 PQM, an SH-60B Helicopter Second Pilot (H2P) shall:

1. Meet the requirements for H2P specified in OPNAVINST 3710.7 (series).
2. Satisfactorily complete an SH-60B Fleet Replacement Squadron (FRS) syllabus or other CNO-approved training syllabus.
3. Satisfactorily complete an approved SH-60B H2P syllabus.

5.2.3 SH-60B Helicopter Aircraft Commander

In addition to completing the requirements set forth for an SH-60B H2P, an SH-60B Helicopter Aircraft Commander (HAC) shall:

1. Meet the requirements for HAC specified in OPNAVINST 3710.7 (series).
2. Satisfactorily complete an approved SH-60B HAC PQS syllabus.

Note

Prior SH-60B HACs are not required to complete applicable H2P syllabus.

5.2.4 SH-60B Functional Checkflight Pilot

In addition to completing the requirements set forth for an SH-60B HAC, an SH-60B Functional Checkflight Pilot (FCP) shall:

1. Complete a squadron SH-60B FCP indoctrination program.
2. Be designated in writing by the Commanding Officer.

5.2.5 Airborne Tactical Officer

An ATO shall:

1. Satisfactorily complete an approved FRS SH-60B Airborne Tactical Officer (ATO) training syllabus or an approved equivalent.
2. Have 30 ATO hours in model and series or in an approved tactical trainer.
3. Satisfy all minimum qualification requirements set forth for pilot qualification in model.

5.2.6 NATOPS Instructor/Assistant NATOPS Instructor

In addition to the requirements set forth for HAC, a NATOPS Instructor/Assistant NATOPS Instructor (NI/ANI) shall:

1. Complete a squadron NI/ANI indoctrination program.
2. Participate in a TYCOM NATOPS evaluator standardization program where applicable.
3. Be designated in writing by the Commanding Officer.

5.2.7 Night Vision Device Pilot

1. Satisfy all minimum requirements set forth for PQM.
2. Satisfactorily complete a Type-Wing approved Night Vision Device (NVD) Pilot Syllabus.

5.2.8 Night Vision Device Pilot Instructor

1. Satisfy all minimum requirements set forth for PQM.
2. Satisfactorily complete a Type-Wing approved NVD Instructor Pilot Syllabus.

5.2.9 Minimum Pilot Currency Requirements

An SH-60B pilot must meet the following minimum requirements in order to be considered current in model:

1. Maintain a current NATOPS evaluation in model.
2. Maintain a current instrument rating in accordance with OPNAVINST 3710.7 (series).
3. Satisfy night and instrument minimum flying hours as set forth in OPNAVINST 3710.7 (series).

5.2.9.1 Pilot Currency Requirements

If currency has lapsed, currency shall be regained by the non-current pilot flying with a current HAC. At the discretion of the Commanding Officer, two non-current HACs may fly together to regain currency.

5.2.9.1.1 Night Currency Requirements

To be considered current, pilots shall have flown 2 hours of night time within the past 45 days. If night currency expires, pilots shall fly 2 hours of night time to regain currency. Unaided or aided night flight is considered night time.

5.3 PILOT SHIPBOARD QUALIFICATIONS

Pilots shall be familiar with the shipboard procedures contained in the CV NATOPS, LHA/LHD NATOPS, and NA 00-80T-122 publications. Initial qualification shall proceed in a build-up fashion. For initial qualification, day operations shall precede night operations, and unaided operations shall precede NVD operations.

5.3.1 Shipboard Landing Qualifications

A DLQ evolution consists of flight at pattern altitude, and approach, a transition to a hover, a landing to a ship deck, and a departure into the pattern again.

Note

Free deck (FD) landing refers to a landing into the RSD with main probe. Recovery Assist (RA) landing refers to a landing using the RA cable and RSD. Clear Deck (CD) landing refers to landing aboard either a non-RAST ship or a RAST-equipped ship without utilizing any RAST system features.

5.3.1.1 Initial Shipboard Landing Qualification

Initial landing qualification requirements are listed in Figure 5-1.

TYPE	DAY	NIGHT (unaided)	NVD
Aviation Ship	3	3	3
Air Capable Ship (clear deck)	6	6	6
Air Capable Ship (free deck)	6	6	6
Air Capable Ship (RA)	2	2	1

Note

- To facilitate completing RA/Free deck initial qualifications the approaches may be cut in half allowing one approach and two landings.
- Free deck qualification confers clear deck qualification.
- Free deck landings in lieu of RA landings are not acceptable for initial qualification.
- Initial night landing qualification shall be preceded by one day landing within the previous six days.
- At least one RA landing shall consist of a full approach, hookup, hover tension, and landing sequence.

Figure 5-1. Initial Shipboard Landing Qualifications

5.3.1.2 Shipboard Landing Currency and Requalification Requirements

The minimum landing currencies for air capable ships and aviation ships are presented in Figure 5-2. If currency has lapsed for more than 1 year, the requirements for the initial shipboard landing qualification shall be completed.

TYPE	DAY	NIGHT (UNAIDED)	NVD
Aviation Ship	2/365	2/90	2/90
Air Capable Ship (clear deck)	4/180	4/60	4/90
Air Capable Ship (free deck)	4/180	4/60	4/90
Air Capable Ship (RA)	1/180	1/60	1/90

Note

- Free deck qualification confers clear deck qualification.
- Free deck landings into the RSD are acceptable to maintain currency if RA cable is not available.
- During requalification, night and/or NVD qualification confers day qualification, and air capable ship qualification confers aviation ship qualification.

Figure 5-2. Shipboard Landing Currency Requirements (Number of DLQ Evolutions Required/Currency Duration in Days)

5.3.2 Pilot VERTREP Qualifications

5.3.2.1 Initial VERTREP Qualification

Initial VERTREP qualification should be attained via a CNO–approved syllabus in the FRS.

5.3.2.2 Shipboard VERTREP Currency and Requalification Requirements

To maintain shipboard VERTREP currency, a pilot shall have completed:

1. Four day shipboard VERTREP evolutions within the last 365 days.

If currency has lapsed for more than 1 year, the requirements for initial VERTREP qualification shall be completed.

Note

During VERTREP requalification, night qualification confers day qualification.

5.3.3 Landing Safety Officer (LSO)

5.3.3.1 LSO Initial Qualifications

Satisfy the following initial qualification requirements:

1. Straightening/Traversing: Four evolutions.
2. Recoveries:
   a. RA — Five Day/five night.
   b. FD into the RSD — Five Day/five night.

Note

Qualified personnel authorized to perform traverse operations shall complete a squadron–approved training syllabus and be designated in writing by the commanding officer.

5.3.3.2 LSO Currency/Requalification

Two day RA recoveries and two day free deck recoveries are required every 90 days to satisfy day currency requirements. Two night RA recoveries and two night free deck recoveries are required every 90 days to satisfy night currency requirements.

If currency expires, requalification shall consist of a minimum of six day and six night recoveries, three of each shall be free deck into the RSD.

If an LSO has not maintained currency for 12 months or more, requirements for requalification shall be the same as for initial qualification with the exception of straightening/traversing evolutions not being required. Free deck landings into the RSD are acceptable as requalification or continuation of qualification if RA cable is not available.

Note

Satisfying night currency/requalification requirements fulfills day and night currency/requalification requirements.

5.3.3.3 LSO Instruction

If all currency requirements are met, the LSO may act as safety observer to instruct trainees. The LSO acting as safety observer will be credited for each type of evolution he/she instructs.

5.4 AIRCREWMAN QUALIFICATIONS

Helicopter aircrewman shall be qualified in accordance with OPNAVINST 3710.7 (series), NAVPERS INST, TYPE/WING Commander instructions, and pertinent sections of this manual. All aircrew designations shall be made by squadron Commanding Officers. All crewmembers meeting the following minimum qualifications are subject to NATOPS evaluation checks in the SH–60B. Aircrewmen are eligible for the following designations once meeting the listed requirements.

1. Sensor Operator (SO) LEVEL I.
   a. Satisfactorily complete either an approved FRS SH–60B aircrewman or CNO approved equivalent syllabus.
   b. Have a minimum of 50 flight hours actual or simulated experience as an SUW/ASW Sensor Operator.
   c. Have a minimum of 20 flight hours actual experience in the SH–60B.
2. Journeyman Sensor Operator (JSO) LEVEL II.
   a. Successfully complete applicable SH–60B PQS or approved Type/Wing equivalent syllabus.
3. Master Sensor Operator (MSO) LEVEL III.
   a. Successfully complete applicable SH–60B PQS or approved Type/Wing equivalent syllabus.
4. Instructor Sensor Operator (ISO) LEVEL IV.
   a. Successfully complete applicable SH–60B PQS or approved Type/Wing equivalent syllabus.
5. Aerial Door Gunner.
   a. Successfully complete applicable SH–60B PQS or approved Type/Wing equivalent syllabus.
6. Search and Rescue Aircrewman.
   a. Be fully qualified as a search and rescue swimmer in accordance with OPNAVINST 3710.7 (series).
7. Search and Rescue Medical Technician.
   a. Be fully qualified Search and Rescue Medical Technician in accordance with OPNAVINST 3730.7 (series), OPNAVINST 3130.6 (series), and NAVMEDCOMINST 1510.17 (series).

5.4.1 Special Mission/Lookout Non-Aircrewman Initial Qualification

Each squadron is allowed temporary non–crewmember flight orders (TFO) to permit non–SUW/ASW aircrewmen (e.g., maintenance personnel) to fly as the commanding officer may direct.

1. Complete an approved squadron flight and ground training syllabus.
2. Fully qualify in:
   a. Ground/line safety procedures.
   b. ICS/radio voice procedures.
   c. Lookout/safety procedures.
   d. In–flight emergency procedures.
   e. Refueling procedures.
   f. Use of the pocket checklist.
3. Meet the requirements as set forth in NATOPS General Flight and Operating Instructions (OPNAVINST 3710.7 series).
4. Log a minimum of 10 flight hours experience in SH–60B.
5. Satisfactorily complete an SH–60B NATOPS evaluation.

5.4.2 Night Vision Device (NVD) Aircrewman

1. Must satisfactorily complete a Type-Wing approved NVD Aircrewman Syllabus.

5.4.3 Night Vision Device (NVD) Aircrewman Instructor

1. Must satisfactorily complete a Type-Wing approved NVD Aircrewman Instructor Syllabus.

5.4.4 Aircrew Currency Requirements

Crewmembers meeting the requirements of OPNAVINST 3710.7 series and NTTP 3-50.1 will be considered current in all respects.

5.4.4.1 Special Mission/Lookout Non-Aircrewman

1. Crewmembers shall meet the requirements of OPNAVINST 3710.7 series while assigned to temporary flight duty.
2. A NATOPS evaluation will be administered if the individual is assigned temporary flight orders after a period of 120 days or more on non-flight duty.

5.4.5 Qualified Observer

A qualified observer is an individual who has met all of the minimum aeromedical and survival requirements for indoctrination flights set forth in NATOPS General Flight and Operating Instructions (OPNAVINST 3710.7 series) and has been thoroughly briefed in accordance with Qualified Observer Brief in Chapter 6.

5.5 GROUND TRAINING REQUIREMENTS

The following minimum requirements are established for qualification in a non-tactical category. Additional qualification requirements for Surface Warfare/Anti-Submarine Warfare (SUW/ASW) tactical operation shall be the approved Fleet Readiness Squadron (FRS) Training Syllabus or an approved equivalent.

5.5.1 Flightcrew Ground Training

1. NAMTD Pilot's Course (or equivalent).
2. Ground school syllabus.
3. Flight operation lectures.
4. Flight manual and ground school exams.

5.5.2 Aircrewman Ground Training

1. Ground school syllabus.
2. SH-60B familiarization lectures.
3. Helicopter safety and survival equipment.
4. Flight manual and ground school exams.

5.6 MINIMUM FLIGHTCREW REQUIREMENTS

The minimum flightcrew requirements for specific flights and missions are:

1. Non-tactical/Familiarization flights — Two H2Ps or one HAC and a qualified observer.
2. Functional checkflights — One FCP, one qualified observer, and one aircrewman or TFO crewmember.
3. Orientation flights — One HAC, one qualified observer, and one aircrewman.

4. Utility missions (passenger and cargo transport, ferry flights, etc.) — One HAC, one PQM, and one utility aircrewman.
5. SAR missions (One HAC, one PQM, one SH–60B aircrewman, and one H–60 rescue swimmer).

Note

Squadron commanding officers are authorized to grant waivers of aircrew qualification requirements when the experience of the individual warrants such action.

5.6.1 SUW/ASW Operational Missions

One HAC, one ATO, and one SUW/ASW sensor operator.

5.6.2 Flights from Air–Capable Ships

Day, VMC — Two H2Ps and one helicopter aircrewman; or one HAC, one qualified observer, and one helicopter aircrewman.

Night or IMC — One HAC, one PQM, and one helicopter aircrewman.

5.6.3 Instrument Flight

Flightcrew for planned instrument flight shall consist of one HAC and one Designated Naval Aviator (DNA) or two H2Ps. Flights in which IMC conditions are simulated through visually restrictive devices shall include a qualified observer in the cabin area. All pilots must hold a valid instrument rating with the exception of the DNA who is receiving instrument refresher training, or if on an instrument check flight.

5.7 RECOMMENDED REQUIREMENTS FOR TRANSITIONING NAVAL AVIATORS

The requirements for transitioning of non–helicopter designated pilots shall be governed by the provision of NATOPS General Flight and Operating Instructions (OPNAVINST 3710.7 series).

5.8 PERSONAL FLYING EQUIPMENT REQUIREMENTS

Flight personnel shall be familiar with and utilize those items of flight clothing and survival and rescue equipment as prescribed in the current NATOPS General Flight and Operating Instructions (OPNAVINST 3710.7 series). In addition, the pilot in command of an aircraft engaged in carrying crewmen or passengers shall ensure their compliance with this instruction.

PART III

Normal Procedures

CHAPTER 6

Flight Preparation

6.1 MISSION PLANNING

Mission Planning shall be conducted in compliance with OPNAVINST 3710.7 (Series) Publications.

Note

Exact values for each aircraft weight and moment are found on the DD Form 365–F and shall be used for Flight Planning.

6.2 BRIEFING/DEBRIEFING

6.2.1 General Briefing

Planning and flight briefings will be conducted by the PIC or flight leader. A briefing guide or syllabus card may be used to conduct the brief. The brief should be clear, concise, and accurate; allowing input from all crewmembers. The brief shall include, but is not limited to, the following items:

1. General.
   a. Flight crew assignments/currency.
   b. Crew/Mission Operational Risk Management (ORM).
   c. Aircraft, call sign(s), Aircraft Discrepancy Books (ADB).
   d. Timeline (preflight, manning, takeoff, hot seat, land).
2. Mission.
   a. General tasking (FAM/INST/TERF/NSW/etc.).
   b. Operating area.
   c. Bingo.
   d. Terminate/“Knock it off”.
   e. SAR capability.
3. Flight Planning.
   a. Weather.
      (1) Current conditions.
      (2) Forecast (OPAREA/recovery).
   b. Abort criteria.
   c. Notice To Airmen (NOTAM).
   d. Aircraft performance calculations.
   e. Fuel availability.
   f. Nav–bag/fuel packet/flight gear.
4. Communication/Navigation.
   a. Frequencies/NAVAIDS.
   b. Radio procedures.

c. Lost Comm.

d. IFF/Air Defense Identification Zone (ADIZ).

5. Flight Crew Coordination/CRM.

a. Control transfer.

b. Lookout procedures.

c. Night/IMC considerations.

d. Vertigo/disorientation.

e. Altitude/Airspeed warnings.

f. Dual-concurrence/call items.

6. Emergency Procedures.

a. Aircraft control.

b. IMC/VMC emergencies.

c. Fires.

d. Loss of tail rotor control/drive.

e. Engine Failure Hover/Forward Flight.

f. Ditching/egress.

g. Simulated emergencies.

6.2.2 Mission-Specific Briefing

Conducted, as applicable, when performing a mission. White board brief may be used to supplement the mission-specific brief for safety of flight issues. The mission-specific brief shall be incorporated for safety of flight issues and CRM for each applicable mission.

1. Functional Checkflight.

a. Test requirements (profile/system evaluated).

b. CRM.

2. Confined Area Landing (CAL)/Landing Zone (LZ).

a. Location (MGRS/lat-long).

b. Depiction (chart/drawing/photo).

c. Site evaluation.

d. Orientation.

(1) Magnetic heading.

(2) Landing point.

e. Markers (panels/smoke).

f. Waveoff procedures.

(1) General heading.

(2) Obstacles.

(3) Effects of wind/dust/snow/debris.

(4) Reentry procedure.

3. Formation.
   a. Number of aircraft, call signs.
      (1) Flight lead.
      (2) Responsibilities.
   b. Type of formation (parade/cruise/combat).
   c. Positioning requirements (bearing/distance).
      (1) Takeoff/landing.
      (2) En route.
   d. Formation maneuvers.
   e. Lead change.
      (1) Comm/visual.
      (2) Lost comm.
   f. Emergency procedures.
      (1) Aircraft emergencies.
      (2) Inadvertent IMC.
      (3) Loss of visual contact.
      (4) Waveoff (flight/individual).
4. Logistics.
   a. Cargo/personnel manifest and brief.
   b. CG/weight limitations.
   c. Internal cargo security/tiedown.
5. NVDs.
   a. Comfort level/safety.
   b. Area/route.
   c. Light level/weather effects.
   d. Minimum altitude.
   e. Lighting (internal/external/LZ).
   f. Maneuvers.
   g. Emergency procedures.
      (1) Aircraft emergencies.
      (2) NVD Failures.
      (3) Inadvertent IMC.
6. Terrain Flight (TERF).
   a. Comfort level/safety.
   b. Area/routes/LZ.
   c. Light level/effects/weather.
   d. Minimum altitude to be flown.

e. Airspeed to be flown.
f. Power check requirements.
g. Minimum essential equipment.
h. Lighting (internal/external/LZ).
i. Maneuvers (bunt/roll/externals/guns/Electronic Warfare [EW]/etc.).
j. Low attitude emergencies.
(1) Aircraft emergencies.
(2) Inadvertent IMC.

7. SAR.
a. Scenario.
b. Lookout.
c. Equipment preparation.
d. Smoke/matrix light use.
e. Hover coordination (crew hover/verbal).
f. Swimmer deployment.
g. Aircraft emergency procedures.
h. Lost ICS procedures.
i. Bingo/Red Light fuel and location.

8. Shipboard operations.
a. Unit, type, hull number, TACAN, call sign.
b. Certification/compatibility.
c. DLQ patterns.
d. Comm/visual signals.
(1) Waveoff.
(2) Fouled deck.
e. Emergency procedures.

9. VERTREP.
a. Ship certification/deck utilization.
b. VERTREP patterns.
c. Comm/visual signals.
(1) Waveoff.
(2) Fouled deck/load.
d. External load hookup/release.
e. External load flight (airspeed/bank angle).
f. Emergency procedures.

10. Weapons.
    a. Weapon type/configuration.
    b. Operating area.
    c. Target location/type.
    d. Control procedures.
        (1) Loading/unloading.
        (2) Voice procedures.
        (3) Weapon conditions (hold/tight/free).
        (4) Release authority.
    e. Emergency procedures.
        (1) Aircraft emergencies.
        (2) Weapon malfunctions.
        (3) Lost ICS.
11. ASW.
    a. Environmental conditions.
    b. Assets available.
    c. Target Characteristics.
    d. Weapons/Stores.
    e. Tactical coordination.
    f. Comm coordination.
    g. Tactics.
        (1) Search.
        (2) Detect.
        (3) Attack.
        (4) Lost Contact.
    h. BHA.
    i. Contingencies.
    j. Emergency procedures.
12. ASuW.
    a. Environmental conditions.
        (1) FLIR performance.
        (2) LASER performance.
        (3) Other.
    b. Assets available.
    c. Target Characteristics.
        (1) Recognition features.
        (2) Aim Points.

d. Stand–off ranges.
e. LASER considerations.
(1) Safety.
(2) Octal Codes.
(3) Spot Size.
(4) Backscatter.
f. Weapons/Stores.
g. Weaponeering.
(1) Mission Kill.
(2) Hard Kill.
h. Tactics.
(1) Search.
(2) Detect.
(3) Track.
(4) Attack.
(a) Autonomous.
(b) Remote.
i. BHA.
j. Communication Coordination.
k. Contingencies.
l. Emergency procedures.

13. Integrated Self–Defense (ISD)/Aircraft Survivability Equipment (ASE) Gear.
a. Hazards/Threats.
b. Defense.
c. Radar Warning System.
(1) Indications.
(2) Setting.
d. Infared Countermeasures (IRCM).
(1) Setting.
e. Chaff/Flare Dispenser.
(1) Setting.

14. Naval Special Warfare (NSW)/Embarked troop operations.
a. Unit, call sign, frequency.
b. Rendezvous location/operating area.
c. Equipment (Special Purpose Insertion Extraction [SPIE]/Rappel/Combat Rubber Raiding Craft[CRRC]).
d. Aircraft rigging/responsibilities.
e. Embark/debark procedures.

f. Troop weapons discipline.

g. Execution.

(1) Altitude.

(2) Airspeed.

(3) Rope length.

(4) Visual signals.

(5) Cabin configuration/coordination.

h. Emergency procedures.

(1) Aircraft emergencies.

(2) Waveoff/abort.

(3) MEDEVAC/CASEVAC.

6.2.3 Gunner Brief

1. Airborne/en route phase.

a. Position of aircraft in flight.

b. Sectors of fire (primary and secondary locations).

c. Lock and load (geographic location).

d. Test fire (location), if applicable.

e. Types of targets anticipated.

f. Clearance points for WEAPONS FREE, WEAPONS TIGHT, and WEAPONS HOLD.

g. Estimated airspeed and altitude (for lead and lag estimates).

h. Voice calls (e.g., taking fire, small arms).

i. Clearance for troops on board and sectors of fire.

j. Position of escorts.

2. Landing/assault phase.

a. Sectors of fire (primary and secondary).

b. Landing position (primary and secondary).

c. Last known position of friendly and enemy units.

d. Expected employment of embarked troops (e.g., perimeter around landing zone).

e. Escort procedures while in landing zone.

f. Destruction of weapons if needed.

6.2.4 Qualified Observer Brief

1. Cockpit procedures.

a. Checklist.

b. Communications (external/internal).

c. Switches and levers (cockpit familiarization).

2. Assistance during actual emergencies.
   a. Engine failure (hover/forward flight).
   b. Engine fire.
   c. Tail rotor loss of control/drive.
3. Emergency egress.

6.2.5 Passenger Brief

It shall be the responsibility of the PIC to ensure all passengers are adequately briefed before flight (Figure 6-1).The brief shall contain the following:

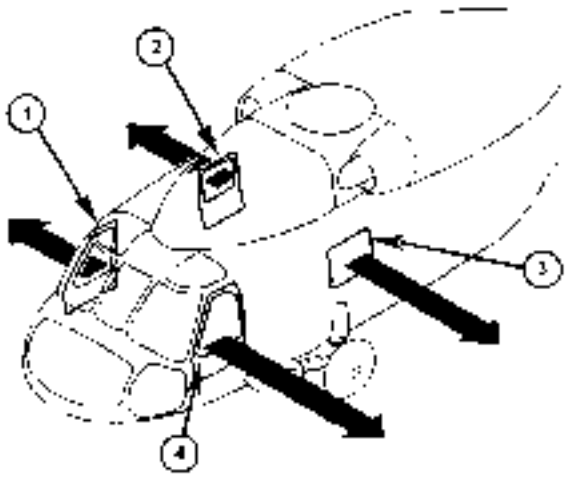
1. Survival equipment (proper wear and use).
2. Entry and exit procedures.
3. Aircraft side number.
4. Hoisting procedures utilizing rescue sling.
5. Gear/equipment stowage.
6. Emergency procedures.
   a. Ditching/egress.
      (1) Overland.
      (2) Overwater.
   b. Emergency exits.
      (1) Doors.
      (2) Jettisonable windows.

6.2.6 Debriefing

A proper debriefing should contain constructive criticism and be conducted in such a manner that all concerned can participate and present their ideas on the conduct of the flight. Each flight shall be thoroughly debriefed as soon as practical upon return by the Pilot in Command/Flight Lead. The debrief should contain the following:

1. Roll call.
2. Brief/mission planning.
   a. Mission objectives.
   b. Smartpack.
   c. Intelligence.
   d. Items missed in brief.
   e. Adequate force composition.
   f. Asset positioning and flow.
   g. Navigation route.
3. Mission administration.
   a. Adequate timeline.
   b. Weather.
   c. Emergencies/equipment problems.
   d. Safety of flight issues.
   e. Communications plan.

4. Mission specific (as applicable).
   a. CSAR/NSW.
      (1) Formation.
      (2) Mission profile (tasking/C3).
      (3) Search/location/authentication.
      (4) Ingress (navigation/altitude/timing).
      (5) Objecting area.
         (a) Landing zone (selection/approach/landing).
         (b) Insertion/extraction method.
         (c) Threats.
      (6) Egress (navigation/altitude/timing).
      (7) Weapons employment (target/BHA).
   b. ASW.
      (1) Environmental conditions.
      (2) Mission profile (tasking/C3).
      (3) Datum.
      (4) Sensor utilization (sensor depth/type).
      (5) Search phase (area assigned/pattern).
      (6) Tracking phase.
      (7) Attack phase.
      (8) Weapons employment (target/BHA).
   c. ASuW.
      (1) Environmental conditions (effects on FLIR).
      (2) Mission profile (tasking/C3).
      (3) Search phase.
      (4) Location/classification/rigging.
      (5) Target characteristics.
      (6) LASING procedures.
      (7) Weapons employment.
   d. SAR.
      (1) Notification.
      (2) Preparation (Cabin/TACNAV setup).
      (3) Search.
      (4) Survivor recovery.
      (5) Survivor delivery.
5. Determine mission success.



1. PILOT JETTISONABLE WINDOW — PULL HANDLE FORWARD.
2. CABIN DOOR WITH JETTISONABLE WINDOW — PULL HANDLE FORWARD.
3. SENSOR OPERATOR JETTISONABLE WINDOW — PULL HANDLE AFT.
4. ATO JETTISONABLE WINDOW — PULL HANDLE FORWARD.

1. KEEP YOUR SEATBELT FASTENED TIGHTLY UNTIL READY TO DEPART THE AIRCRAFT. STAY STRAPPED IN UNTIL DIRECTED BY THE CREWMAN.
2. KEEP YOUR CRANIAL AND LIFEVEST ON AT ALL TIMES.
3. ORIENT YOURSELF WITH RESPECT TO THE EMERGENCY EXITS IN AIRCRAFT DIAGRAM.
4. ALL EXITS CAN BE JETTISONED BY PUSHING FORWARD THE YELLOW HANDLE EXCEPT THE SENSOR OPERATOR, WHICH MUST BE PULLED AFT. THE WINDOWS CAN THEN BE PUSHED OUT.

IN CASE OF A CRASH OR DITCHING:

1. REMAIN STRAPPED IN UNTIL ALL MOTION HAS STOPPED.
2. IF THE AIRCRAFT REMAINS UPRIGHT, REMAIN STRAPPED IN AND WAIT FOR INSTRUCTIONS FROM THE CREW.
3. GRAB A REFERENCE POINT.
4. AFTER THE AIRCRAFT ROLLS OVER IN THE WATER AND ALL VIOLENT MOTION HAS STOPPED, UNSTRAP AND EXIT THE AIRCRAFT IMMEDIATELY BY THE NEAREST EXIT. DO NOT INFLATE YOUR FLOTATION EQUIPMENT UNTIL YOU ARE OUTSIDE THE AIRCRAFT. DO NOT KICK.
5. REMAIN CLEAR AND UPWIND OF THE HELICOPTER. DON'T PANIC.

Figure 6-1. Passenger Briefing Card

CHAPTER 7

Normal Procedures

7.1 LINE OPERATIONS

Observe flight line safety practices in accordance with NAV-SOP-2455 (series).

7.2 FLIGHT SCHEDULING

Specific requirements are listed in OPNAVINST 3710.7 (series).

7.3 PREFLIGHT

Prior to flight, the PIC shall ensure that a complete visual check of the helicopter has been conducted. The preflight inspection should be divided among the pilot, copilot, and aircrewmen.

7.3.1 General

Note

- In each location (Figure 7-1), inspect for corrosion, Foreign Object Damage (FOD), condition, and security.
- Check that all securing hardware is safety-wired, cotter-keyed, and/or slipmarked.
- Plastic caps on avionics present a FOD hazard; check for security.

1. Chocks/Tiedowns — IN PLACE (as required).
2. Underside of all main rotor blades and tip caps.
3. All inlet/exhaust plugs and pitot-static tube covers — REMOVE.

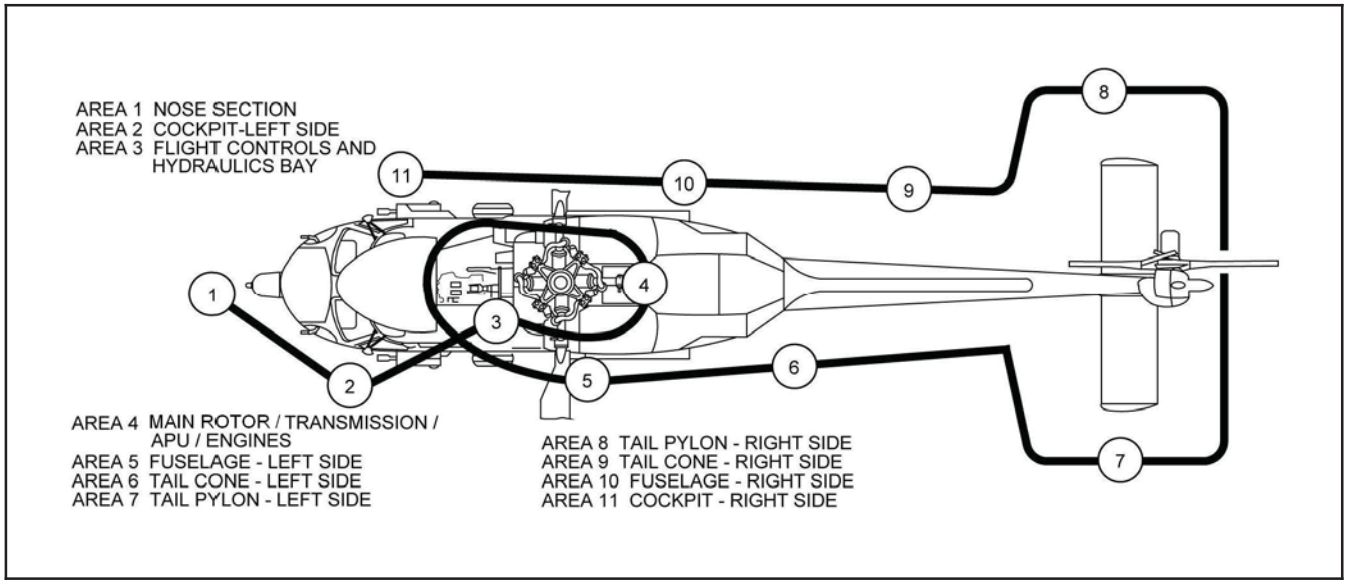


Figure 7-1. Inspection Diagram

4. Sonobouy launcher valve safety lockout in the LOCK position. FREE position if no sonobouys installed.

WARNING

Sonobouy launcher valve safety lockout shall be in the SAFE position when sonobouys are installed while in the vicinity of ground personnel.

5. If weapons are loaded, refer to technical manual, Airborne Weapons/Stores Loading Manual (A1-H60BB-LWS-720), for appropriate weapon preflight instructions.

7.3.2 Nose Section (Area 1)

1. Windshield, wipers, OAT gauges/probes, and pitot tubes.
2. Avionics compartment.

CAUTION

Care must be taken when opening the nose avionics compartment to prevent water intrusion damage.

a. LASER ENABLE/DISABLE switch — AS REQUIRED.

Note

If LASER ENABLE/DISABLE switch is in the DISABLE position, the LASER DISABLED advisory will be continuously illuminated.

b. GIMBAL switch — ENABLE (as required).

3. Antennas.
4. Searchlight — STOWED.
5. FLIR (if installed).
   a. FLIR turret — STOW POSITION.
   b. FLIR turret cables — CONNECTED.
   c. FLIR nose mount — SECURE.
   d. FLIR nose mount grounding straps — SECURE.
   e. Bore sight module — REMOVED.

7.3.3 Cockpit - Left Side (Area 2)

1. Door.
2. Seat and harness.

WARNING

Do not stow articles or equipment under seats or in seat wells. These objects can interfere with proper seat stroking and reduce their energy-absorbing performance during impact.

3. Battery/Avionics well.
4. Flight controls.
5. WPS — SELECT A or B.
6. Radar pressure pop-out button — NOT POPPED.
7. FLIR HCU.
8. Verify AN/ASQ-198 weapon type selection switches are in appropriate position for proper ordnance loaded.

WARNING

If weapon type selection switch does not match actual ordnance loaded, weapon malfunction may occur.

7.3.4 Flight Controls and Hydraulics Bay (Area 3)

1. Engine inlets.

WARNING

With gusty or sustained wind conditions in excess of 10 knots, nearby jet blast or rotor wash, the hydraulics bay cover can be blown off when in transit or in the open position and may cause loss of the door and/or personnel injury.

2. Pilot-assist module PDI — FLUSH.
3. Mixing unit.
4. Collective bias tube/LDS cable.

WARNING

Improper installation of the LDS roll pin may result in an engine overspeed. Proper installation is indicated by the LDS roll pin protruding from both sides of the LDS control cable rod and the collective bias tube with the safety wire intact.

5. Hydraulic pump modules — FLUID LEVEL, FILTER, PDIs FLUSH AND QUICK DISCONNECT LINES SECURE.
6. Primary servos.
7. Ensure hydraulic lines are secure by Adel clamps and not contacting each other or any structure of the helicopter.
8. Accessory and input modules.
9. Generators.

10. LDS roll pins and mounts.

WARNING

Improper LDS installation may result in an engine overspeed or other engine malfunctions.

11. Hydraulic hand pump service reservoir:
    a. Fluid level.
    b. Hydraulic service valve selector pointed toward reservoir (#4 position).
    c. Cap secure.

7.3.5 Main Rotor/Transmission/APU/Engines (Area 4)

1. Main rotor system, accumulator level/pressure, dampers, blades, BIM® indicators, elastomeric bearings, droop stops, flap restraints, centering sockets, PCRs and scissor bearings.

WARNING

- If black is visible on the BIM® indicator, it may be an indication of blade damage. The cause of the black indication shall be determined prior to flight.
- Do not exceed open engine cowling work platform weight limits. Excess weight may cause failure of the composite rib hinge assembly and result in serious injury to personnel.

2. MRB lockpins and pitch locks.
    a. Blades spread — MRB LOCKPINS ENGAGED, PITCH LOCKS RETRACTED, FLAP RESTRAINT CAMS DO NOT BIND AND ARE FREE TO ROTATE.
    b. Blades folded — MRB LOCKPINS FULLY RETRACTED, PITCH LOCKS ENGAGED.
3. Engine oil filler caps — SECURE.
4. NO. 1/NO. 2 engines — OIL LEVEL.
5. Engine oil/fuel filter PDIs — FLUSH.
6. Engine compartments.
7. Deswirl duct clamps — SECURE.
8. Transmission oil level — CHECK, SECURE DIPSTICK.
9. Rotor brake/gust lock — CHECK POSITION.
10. Ensure hydraulic lines are secure by Adel clamps and not contacting each other or any structure of the helicopter.
11. APU oil level — CHECK, SECURE DIPSTICK.
12. ECS compartment — J-TUBE SECURE.
13. Tail drive shaft/viscous dampers — CONDITION.

14. Fire-extinguisher bottles — CORRECT CHARGE.
15. Upper antennas.
16. IRCM Transmitter.

CAUTION

Handling covert windows with bare hands may cause damage to components.

17. All topside access panels — SECURE.

WARNING

Failure to properly secure all panels and doors may result in damage to equipment and catastrophic control failure.

7.3.6 Fuselage - Left Side (Area 5)

1. Avionics cooling exhaust.
2. Landing gear, step, WOW switch.
3. Position light, grounding wire, float bag fairing, and static port.
4. Tire and brake indicator pins.
5. Junction box panel.
6. Pylon/stores — AS REQUIRED.

CAUTION

Do not attempt to lift LHEP when the M299 Launcher is installed. Damage to the launcher, pylon, sway braces, or BRU-14/A bomb rack may occur.

a. Left Hand Extended pylon (LHEP) umbilical to M299 launcher — Connected.
   (1) Breakaway lanyard for M299 launcher umbilical attached to hard point.
b. M299 launcher.
   (1) SAFE/ARM switch — SAFE.

CAUTION

If missile is loaded, missile seeker head covers shall be installed, if available, during all ground operations and before all chock and chain operations to prevent damage to the seeker head.

7. Cabin window.
8. Water wash connector access panel.

9. Sonobouy launcher cover/sonobouys — AS REQUIRED.
10. Fueling compartments.
11. Fire extinguisher thermal plug — IN PLACE.
12. ESM antenna housing.
13. ALQ-205 IR transmitter.
14. Engine exhaust.
15. APU exhaust.
16. Underside of helicopter — ANTENNAS/PANELS.

7.3.7 Tail Cone - Left Side (Area 6)

1. Tail wheel.
   a. Manual unlock lever — UP POSITION.
   b. Slip mark — ALIGNED.
2. Tail probe — CHECK IN UP POSITION.
3. Chaff/Flare dispenser — SAFE (note loadout).
4. Antennas.
5. Anti-collision light.
6. Drive shaft cover and hinge pins.
7. Pylon-fold hinge fittings.
8. Intermediate gearbox — OIL LEVEL/FILLER CAP.

7.3.8 Tail Pylon - Left Side (Area 7)

1. Stabilator locking pin and keeper — FULL EXTENSION AND LOCKED.
2. Position light.
3. ASE sensors and housing.
4. Tail bumper — STRUT EXTENSION, PAD WEAR.

7.3.9 Tail Pylon - Right Side (Area 8)

1. Stabilator locking pin and keeper — FULL EXTENSION AND LOCKED.
2. Tail rotor blades, bonding wires, pitch-change links.
3. Tail rotor indexer — RETRACTED.
4. Tail rotor de-ice harness and cannon plugs — SECURE.
5. Anti-collision light.
6. Tail gearbox — OIL LEVEL/FILLER CAP.

WARNING

- Ensure oil filler cap is secure by pulling out on cap while turning clockwise to ensure it is seated in locked position. Failure to secure properly may cause cap to depart, causing binding in tail rotor controls and/or loss of TGB oil.
- An over-serviced TGB and/or a red tint to TGB oil are possible signs of contamination with hydraulic fluid. Failure of the TGB is possible.

7. Tail gearbox cowling — SECURE.
8. Pylon access steps — STOW.

7.3.10 Tail Cone – Right Side (Area 9)

1. Pylon fold locking pin and keeper — FULL EXTENSION AND LOCKED.
2. Drive shaft sections, viscous dampers, quick disconnect and covers.
3. Chaff/Flare dispenser — SAFE (note loadout).
4. MAD towed body, reeling machine, and support.

7.3.11 Fuselage – Right Side (Area 10)

1. ECS exhaust/engine exhaust.
2. Antennas.
3. Fuel dump port.
4. Transition section.
   a. Avionics.
   b. Tail rotor cables — ROUTING AND CHAFFING.
5. Pylon/external stores/FLIR if installed — AS REQUIRED.
6. Cabin door.
7. Rescue hoist.
8. Ice detector.
9. Junction box panel.
10. Landing gear, step.
11. Avionics cooling exhaust/inlet.
12. Position light, grounding wire, float bag fairing, and static port.
13. Tire and brake indicator pins.
14. External power access panel.

7.3.12 Cockpit – Right Side (Area 11)

1. Door.
2. Seat and harness.

WARNING

Do not stow articles or equipment under seats or in seat wells. These objects can interfere with proper seat stroking and reduce their energy-absorbing performance during impact.

3. Avionics well.
4. Flight controls.
5. ELT — ARM.
6. Windshield washer reservoir — FLUID LEVEL/FILLER CAP.
7. Rotor brake handle lockpin — RELEASE.

7.3.13 AGM-114 Hellfire Preflight Checklist

1. Port forward weapons station quick release pins — INSTALLED/HANDLES LOCKED.
2. M299 launcher.
3. M299 umbilical to launcher — Connected.
   a. Breakaway lanyard for launcher umbilical attached to hard point.
4. M299 SAFE/ARM switch — SAFE.
5. AGM-114 Hellfire missile (if installed).
   a. Correct Hellfire missiles loaded.
   b. Missiles correctly loaded.
   c. M299 launcher latch handle(s) — AFT. Any excessive movement of latch handle should be reported to qualified personnel.

CAUTION

Correct missile loading may be tested by grasping the missile just aft of the seeker head and pulling with both hands. The release handle should be rigid and the holdback release will be canted aft. If the handle moves freely, the mechanism is not latched. Notify qualified personnel.

   d. Hellfire missile seeker head covers — ON (if available).

7.3.14 Mk 46 Torpedo Preflight Checklist

1. Armament switches — OFF/SAFE/NORMAL.
2. Weapon loaded sign — On cyclic stick.
3. BRU-14 — SAFE.
4. Weapon — Secure on pylon.
5. Inboard stations.
   a. 42-inch band release wire — Through groove in aft/inboard sway brace pad; connected to snaphook.
   b. Arming wire — Connected to tail arming solenoid and seawater battery arming lanyard.
   c. Seawater battery arming lanyard — Cut and deburred.
   d. Preset cable — Connected; forward slack removed; secured to aft outboard sway brace.
   e. Preset cable pullout lanyard — Connected to armament bracket snaphook.
   f. Parachute band release wire and static line — Attached to armament bracket snaphook.
   g. Snaphook opening — Facing aft.
   h. Parachute band release wire — Cut and bent.
6. Outboard stations.
   a. 42-inch release wire — Through groove in aft/inboard sway brace pad; connected to armament bracket snaphook.
   b. Arming wire — Connected to tail arming solenoid and seawater battery lanyard.
   c. Seawater battery arming lanyard — Cut and deburred.

d. Preset cable — Connected; forward slack removed; secured to aft outboard sway brace.

e. Preset cable pullout lanyard — Connected to swing arm snaphook.

f. Parachute band release wire — Cut and bent.

7. Stabilizer — Not damaged, clamp installed.
8. Nose cover — Installed.
9. All tape — Removed.
10. Pylon door — Secured.

Note

The following steps shall be performed after engine turnup.

11. (REXTORP/EXTORP) Nose cover, ballast safety strap, and air stabilizer clamp — Remove.
12. (WARSHOT) Nose cover, air stabilizer clamp — Remove.

7.3.15 Mk 50 Torpedo Preflight Checklist

1. Armament switches — OFF/SAFE/NORMAL.
2. Weapon loaded sign — On cyclic stick.
3. BRU-14 — SAFE.
4. (WARSHOT) Exploder ARM/SAFE — SAFE.
5. 53-inch release wire — Secured by aft outboard sway brace or inboard of sway brace pad.
6. Weapon — Secure on pylon.
7. (EXERCISE) Scuttle safing — ARM.
8. Arming wire — Connected to tail solenoid and lanyard start assembly.
9. Lanyard start assembly — Cut at red mark and deburred.
10. Preset cable — Connected; forward slack removed; secured to aft/outboard sway brace.
11. (Inboard station) Preset cable pullout lanyard/static line — Connected to aircraft and torpedo.
12. (Outboard station) Static line — Connected to armament bracket.
13. (Outboard station) Preset cable pullout lanyard — Connected to swing arm.
14. Nose cap — Installed; not damaged.

Note

Nose protective cap shall remain installed during flight. It is a breakaway type and will shatter upon water entry. Do not remove before flight.

15. All tape — Removed.
16. Pylon door — Secured.

Note

The following step shall be performed after engine turnup.

17. (WARSHOT) ARM/SAFE indicator — ARM.

7.3.16 Cabin Inspection

1. M60D/M240D/GAU-16/A Gun-mount.

WARNING

To facilitate cabin egress, all crew-served weapons and their support equipment should be removed during missions not requiring weapons installations.

CAUTION

Visually inspect quick release pin for excessive wear or damage and the presence of proper plastic zip ties.

2. HIFR connections/fittings.
3. Rescue Station.
   a. All switches — OFF/NORMAL.
   b. Hoist shear switch — SHEARWIRED.
   c. Hoist pendant.
   d. Hover grip.
   e. ICS cord.
4. Fire extinguishers.
5. First aid kits.
6. Crash ax.
7. APU accumulator pressure gauge — 2,650 psi minimum.
   a. APU pump handle.
8. Sonobuoy launcher — 900 psi minimum (with sonobuoys installed).
   a. Sonobuoys loaded — VNT indication.
   b. Valve safety lockout — AS REQUIRED.
9. MAD AMP POWER supply switches — ON (Block I).
   a. Mad AMP is located in the SO Rack Block 0.
10. Litter tray — INSTALLED.
11. Transmission oil filter impending bypass indicator.

12. RAST.
    a. Ratchet with adapter.
    b. Backup messenger assembly — INSTALLED.
13. Cabin door window — SHEARWIRED.
14. Cabin door HEELS battery/ADHEELS/IHEELS — TEST.
15. Mission avionics racks/panels.
    a. ADS POWER — ON.
16. THP-1 and THP-2 — INSTALLED.
17. PDB.
    a. Circuit breakers — IN.
    b. HELLFIRE PWR switch — OFF.
18. Mobile Aircrew Restraint System (MARS), if applicable.

WARNING

Only the modified crewmember's aircraft safety belt, P/N MS16070-21/A, will be used with the RMU-42/A retractor, mobile aircrew webbing. Use of unmodified belts is unauthorized; use of MS16070-21, MS16070-3, or MS16070-2 could result in serious injury in the event of a fall or aircraft mishap.

CAUTION

Do not let go of an extended retractor strap. Slowly guide it back for stowage so it does not slam into the retractor or cause personal injury.

a. Visually check the entire assembly for general condition.
b. Ensure ceiling retaining plate is flush against the cabin overhead soundproofing. Any movement of the webbing strap assembly mounting bolt is not allowed. Webbing strap assembly shall rotate freely.
c. Place the control handle in the auto lock position.
d. Extend the strap approximately eight inches and jerk the strap until the retractor locks. There shall be no further extension of the strap when it is pulled.
e. While still locked, release pull on the strap. The strap shall retract automatically. Cycle the control handle.
f. Extend the strap approximately eight inches; place the control handle in the manual lock position.
g. There shall be no further extension of the strap when pulled and the strap shall automatically retract when guided back in.

19. Instructor/passenger seat/belts — Condition and security.
20. SO seat, inertial reel, and seat track — Condition and security.
    a. Under seat area.

WARNING

The area directly under each seat shall be clear of any stowed articles. Failure to keep this area clear may preclude full vertical stroke of seat bucket in a crash.

21. SO station.
    a. All switches — OFF/NORMAL.
    b. ICS cords.

Note

Ensure the FLIR ICS cord is connected to either the SO or instructor ICS station.

    c. FLIR HCU.
    d. FLIR VCR mounting plate — IF INSTALLED.
22. SO window emergency release handle — SHEARWIRED.
23. Lower SO console (ESP only).
    a. All switches — OFF/NORMAL.
24. Survival gear, loose equipment, cargo, internal stores — Properly stowed.
25. Circuit breakers — VERIFY.
26. NATOPS Manual — INSTALLED.

7.4 START CHECKLIST

Note

Daggered (†) steps need not be accomplished on subsequent flights on the same day.

7.4.1 Prestart Checks

CAUTION

- Moving flight controls without first or second-stage pressure on the primary servos may cause damage to the flight controls.
- During high wind conditions (greater than 30 knots) and with AC power supplied, the stabilator can automatically program. If the stabilator is folded, damage may occur. Consideration should be given to disengaging stabilator auto mode while the stabilator is folded.

1. Seats, belts, pedals, mirrors — ADJUSTED.
2. Cockpit window emergency release handles — AFT AND SHEARWIRED.
3. Left collective — EXTENDED AND LOCKED.
4. Circuit breakers and switches — CHECKED AND OFF.

Switches not having an OFF position should be checked as follows:

a. RDR, DATA LINK — STBY.
b. ATO ICS — NORM.
c. DATA LINK MODE — AUTO.
d. GUARD REC — ON.
e. COMM CONTR mode select — T/R.
f. GUST LOCK — NORM.
g. TAIL SERVO — NORM.
h. Pilot ICS — NORM.
i. CARGO HOOK ARMING — SAFE.
j. CARGO HOOK EMER RLSE — OPEN.
k. FIRE DET TEST — OPER.
l. DE-ICE MASTER — MANUAL.
m. MODE 4 AUDIO/LIGHT/OUT — AUDIO.
n. Transponder ANT — DIV.
o. COMP panel — SLAVED, LAT CHECKED.
p. FUEL MGT panel, MASTER/MODE switches — STOP FLOW/AUTO.
q. SERVO SHUTOFF SWITCH — CENTER.

5. Parking brake — RESET.
6. TAIL WHEEL — LOCK.
7. Aircrewman Prestart Checklist — COMPLETE.
8. Engine T-handles — FORWARD.
9. APU T-handle — IN.
10. Rotor brake — ON.

WARNING

Do not release rotor brake if blades are folded unless secured in place by blade crutches/clamps. Releasing the rotor brake with unsecured folded blades may result in damage to aircraft injury to nearby personnel, and/or all four blades rotating together, which may result in aircraft rollover.

11. BATT switch — ON (#1/#2 CONV, AC ESS BUS OFF, STABILATOR, and AFCS DEGRADED caution, WOW and ROTOR BRAKE advisory — ILLUMINATE).
12. UHF backup — SET.

13. Fire detector system — TEST.
    a. FIRE DET TEST knob — POSITION 1 (APU T-handle, engine T-handles, and master warning panel FIRE lights illuminate).
    b. FIRE DET TEST knob — POSITION 2 (engine T-handles and master warning panel FIRE lights illuminate).
    c. FIRE DET TEST knob — OPER (all fire warning lights extinguished).
14. Fire guard — POSTED, AREA CLEAR.
15. Internal/Exterior/NVD Lighting — AS REQUIRED.
16. APU — START.
    a. ECS — OFF.
    b. AIR SOURCE ECS/START switch — APU.
    c. FUEL PUMP switch — APU BOOST.
    d. APU CONTR switch — ON.

CAUTION

- APU exhaust flow may affect other aircraft equipment and cause possible heat damage. Proper clearance should be checked prior to APU start.
- Only the RESERVE position of the FIRE EXTGH switch will operate without AC power.
- To prevent an APU exhaust fire, wait at least 2 minutes after APU shutdown to attempt a restart to allow residual fuel to vaporize.

Note

- Do not cycle the BATT switch or turn off the APU CONTROL switch if the APU shuts down during start or after it is running. This removes the cause of the shutdown from the APU BITE indicator.
- When mission avionics COMSEC gear is loaded with external power, use of the APU generator may zeroize the codes.

17. APU GENERATOR switch — ON (as required).
18. ICS/RADIO — CHECK.
19. ECS — AS REQUIRED.
20. Blade/pylon spread — AS REQUIRED.

CAUTION

- Should the blade fold system stall during spread, cycling the BLADE FOLD switch to FOLD should return the rotor blades to the folded position.
- Shut down the APU immediately if a rotor blade remains stalled in the APU exhaust.
- When the ROTOR SPREAD light is not illuminated, pressing the AFCS CONTROL panel RDR ALT pushbutton during blade fold system operations may cause failure of the system. Press this pushbutton only if flashing and after the blade spread evolution has been completed.

a. Area — CLEAR (wing walkers positioned as required).

b. CMPTR PWR/RESET pushbutton — ON.

c. BLADE FOLD MASTER switch — ON.

d. BLADE FOLD switch — SPREAD.

e. PYLON FLIGHT and ROTOR SPREAD lights — ILLUMINATED.

WARNING

Illumination of the ROTOR SPREAD light may not be an accurate indication of the blades being properly spread. Rotor engagement with improperly spread blades may result in catastrophic rotor failure. A head check shall be conducted any time the BLADE FOLD switch is moved from the OFF position.

f. RDR ALT pushbutton — PRESS (if flashing).

Note

If RDR ALT pushbutton is flashing, pressing will update flight control position to AFCS.

g. BLADE FOLD switch — OFF.

h. BLADE FOLD MASTER switch — OFF.

i. Proceed to step 22, Head Check.

†21. Lockpins status — CHECK.

a. BLADE FOLD MASTER switch — ON.

b. ROTOR SPREAD and PYLON FLIGHT lights — ILLUMINATED.

WARNING

If the PYLON FLIGHT light is not illuminated, the pylon and stabilator lockpins and the tail rotor indexer shall be visually inspected prior to flight. Failure to do so may cause separation of the tail pylon.

CAUTION

Tail rotor damage may occur if indexer is not fully retracted.

c. If ROTOR SPREAD light not illuminated:

(1) CMPTR PWR/RESET pushbutton — OFF.

(2) BACKUP HYD PMP switch — OFF.

(3) BLADE FOLD switch — SPREAD (5–7 seconds).

WARNING

Illumination of the ROTOR SPREAD light may not be an accurate indication of the blades being properly spread. Rotor engagement with improperly spread blades may result in catastrophic rotor failure.

CAUTION

- With a malfunctioning micro switch or blade fold logic module, keeping the BLADE FOLD switch in SPREAD longer than 5–7 seconds may cause the blade fold lockpins to fully retract, resulting in an uncommanded blade fold and possible damage to the aircraft.
- If uncommanded blade fold occurs when the BLADE FOLD switch is placed to SPREAD, the BLADE FOLD MASTER switch should be placed in the OFF position. Do not secure electrical or hydraulic power until blades are respread using blade fold test set.

d. If ROTOR SPREAD light remains off:

(1) BLADE FOLD switch — OFF.

(2) BLADE FOLD MASTER switch — OFF.

(3) Head check — PERFORM.

Note

- If the ROTOR SPREAD light remains off, there may or may not be a SPREAD INCOMPLETE caution. The aircraft can be safely flown as long as a proper head check is performed.
- If a documented discrepancy exists in the blade lockpin/microswitch indicating system, the BLADE FOLD switch may be left in the OFF position if the blade lockpins were visually checked on preflight.

e. If ROTOR SPREAD light illuminated:

(1) BLADE FOLD switch — OFF.

(2) SPREAD INCOMPLETE caution — DOES NOT APPEAR.

(3) BLADE FOLD MASTER switch — OFF.

†22. Head check — AS REQUIRED.

a. Blade Lock Pins Engaged.

b. Pitch Lock Pins Retracted.

c. Gust Lock Disengaged.

Note

A head check shall be conducted any time the BLADE FOLD switch is moved from the OFF position.

†23. IGB/TGB Oil Level Check — AS REQUIRED (after Pylon Spread).

24. CMPTR PWR/RESET pushbutton — CYCLE, ON.

25. SAS/BOOST pushbutton — ON.

26. BACKUP HYD PMP switch — ON.

Note

If electrical loads are introduced (e.g., backup hydraulic pump) while operating from APU generator or external power, an AFCS power sever may occur, indicated by appearance of the AFCS DEGRADED caution. To restore AFCS computer power, press CMPTR PWR/RESET pushbutton on AFCS CONTROL panel.

7.4.2 Systems Checks

†1. DIGITS — ON; CDU and PDU — TEST.

a. CDU LAMP TEST button — PRESS AND HOLD. All lights and RTR OVERSPEED lights go on. CDU digital displays read all 8's. Release button, all lights go off and digital displays return to original reading.

b. PDU TEST buttons — PRESS AND HOLD. All display lights illuminate and torque reads 188. Release buttons, all lights go off, and digits return to original reading.

2. Fuel quantity and readouts — CHECK.

Note

The maximum difference between the fuel quantity indicators on the VIDS, and total fuel digital readout shall not be more than 200 pounds.

a. Press and hold the FUEL TEST pushbutton. Indicators move to zero and digital display reads 0 – 20. #1 and #2 FUEL LOW cautions lights, plus the MASTER CAUTION light, illuminate. Release pushbutton. Indicators and digital readout return to previous quantity.

3. Caution, advisory, warning lights — CHECK.

a. The following caution and advisory lights should be on:

(1) #1 and #2 GEN.

(2) #1 and #2 FUEL PRESS.

(3) #1 and #2 ENGINE OIL PRESS.

(4) #1 and #2 HYD PUMP.

(5) SAS.

(6) AFCS DEGRADED.

(7) MAIN XMSN OIL PRESS.

(8) WOW.

(9) ROTOR BRAKE.

(10) #1 and #2 ENG ANTI–ICE.

(11) APU ON.

(12) APU GEN ON.

(13) PRIME BOOST PUMP.

(14) BACK-UP PUMP ON.

(15) PARKING BRAKE ON.

b. BRT/DIM-TEST — TEST. All caution/advisory lights go on. All warning lights on master warning panels go on and LOW ROTOR RPM lights flash. All pushbutton legends on AI/BDHI mode selector panels go on. The AFCS CONTROL panel, STABILATOR, BLADE FOLD control panel, FMCP, and crew HOVER TRIM engage panel lights illuminate.

c. BRT/DIM-TEST — RELEASE. MASTER CAUTION lights should flash 16 times. Note that no CHIP cautions are on.

4. RAD ALT, BAR ALT, clocks — SET.

5. TACAN — REC.

6. IFF MASTER — STBY.

†7. Primary servos — CHECK.

a. SAS 1, SAS 2 pushbuttons — OFF.

b. SAS/BOOST and CMPTR PWR/RESET — Check ON.

c. Servo Interlock Check:

(1) Pilot's SERVO switch — 1ST OFF. No allowable flight control movement. #1 PRI SERVO PRESS caution and both MASTER CAUTION lights illuminate. Copilot's SERVO switch 2ND OFF and back to center. No change in lights.

(2) Pilot's SERVO switch — 2ND OFF. No allowable flight control movement. #2 PRI SERVO PRESS caution and MASTER CAUTION warnings on. Copilot's SERVO switch 1ST OFF and back to center. No change in lights.

(3) Pilot's servo switch back to center. Repeat steps (1), and (2), beginning with copilot's servo switches.

Note

During the Servo Interlock check, proper operation of the system will prevent the #2 Primary servo from being shut off with the #1 PRI SERVO PRESS caution on; and the #1 Primary servo from being shut off with the #2 PRI SERVO PRESS caution on.

d. Pilot's SERVO switch — 1ST OFF.

e. Pitch lockpin status — CHECK. While holding the collective fixed in the full up position and with the tail rotor pedals neutral, the cyclic shall be moved in a square pattern. Any restriction to the full range of cyclic motion may be indicative of an extended pitch lock.

f. Check for binds and restrictions while slowly moving cyclic and collective through full range.

g. Move collective full travel (up and down) in approximately 2 seconds. Ensure no longitudinal or lateral cyclic control feedback is felt, and that the #2 PRI SERVO PRESS light does not illuminate while the collective is in motion.

Note

- During control checks, the pilot's or copilot's cyclic may contact a portion of the glare shield padding or instrument panel knobs which is usually obtained with mid-collective, full left pedal, and full forward cyclic, which is not a normal in-flight control combination.
- With the collective control in the full up position and the cyclic stick at the forward left corner of its movement envelope, a ratcheting may be felt through the cyclic control and airframe and heard in the cockpit as the cyclic control is moved to the right. This normal ratcheting of the swash plate uniball bearing on the star guide assembly will occur at the specific flight control orientation and movement listed above only. Ratcheting or binding noted with the flight controls orientation at any other position or direction of movement must be assumed to be an unassociated control problem or deterioration of the Teflon coating on the uniball bearing.

h. Pilot's SERVO switch — 2ND OFF.

i. Check for binds or restrictions while slowly moving cyclic and collective through full range.

j. Move collective full travel (up and down) in approximately 2 seconds. Ensure no longitudinal or lateral cyclic control feedback is felt, and that the #1 PRI SERVO PRESS light does not illuminate while the collective is in motion.

k. Pilot/copilot SERVO switches — CENTER. #1/#2 PRI SERVO PRESS caution lights OFF.

†8. Boost servos — CHECK.

a. Collective and Pedals — MIDPOSITION and RIGHT PEDAL SLIGHTLY FORWARD OF NUTRAL.

Note

Slight pedal control deflection may be necessary to prevent excessive collective movement.

b. SAS/BOOST pushbutton — OFF. BOOST SERVO OFF and AFCS DEGRADED cautions appear and MASTER CAUTION lights illuminate.

c. Move flight controls through full range of travel. Note increase in control forces (except lateral).

d. Collective and Pedals — MIDPOSITION and RIGHT PEDAL SLIGHTLY FORWARD OF NEUTRAL.

e. SAS/BOOST pushbutton — ON. BOOST SERVO OFF and AFCS DEGRADED cautions disappear.

f. Collective — FULL DOWN.

†9. Tail rotor servo — CHECK.

a. TAIL SERVO switch — BKUP. #1 TAIL RTR SERVO caution, #2 TAIL RTR SERVO ON advisory and MASTER CAUTION lights illuminate. Check for binds and restrictions while moving tail rotor pedals through full range.

b. TAIL SERVO switch — NORM. #1 TAIL RTR SERVO caution and #2 TAIL RTR SERVO ON advisory disappear.

†10. AFCS ground check.

a. SAS — CHECK.

(1) CMPTR PWR/RESET (2-minute warm-up) and SAS/BOOST pushbuttons — Check ON.

(2) TRIM and AUTO PLT pushbuttons — Check OFF.

(3) SAS 1 pushbutton — ON for at least 10 seconds, then OFF. SAS fail advisory lights and AFCS DEGRADED caution should not appear during self-test.

(4) SAS 1 pushbutton — ON, then OFF. No movement should occur in either main rotor blades or flight controls.

(5) Repeat step (4) for SAS 2.

b. Trim — CHECK.

Note

Do not depress trim release switches during gradient force checks.

(1) TRIM pushbutton — ON, then OFF. No movement should occur in flight controls.

(2) TRIM pushbutton — ON.

(3) Move cyclic fore, aft, and laterally checking for symmetrical gradient force increase with control and pedal displacement.

(4) Center pedals and place collective at midposition. Check for gradient force increase with collective and pedal displacement.

c. Autopilot — CHECK.

(1) SAS 1, SAS 2, and TRIM pushbuttons — ON.

(2) AUTO PLT pushbutton — ON and OFF. No movement should occur in flight controls.

(3) AUTO PLT pushbutton — ON.

(4) Move controls through full range. Check for restrictions, control feedback, and rotor blade chatter.

Note

If any restricting control feedback or rotor blade chatter is detected, repeat step with SAS/Trim/Autopilot individually disengaged to determine the channel and axis where the discrepancy exists.

(5) Pilot AFCS RELEASE switch — CHECK. SAS 1, SAS 2 and AUTO PLT lights off. SAS caution and MASTER CAUTION warning on.

(6) SAS 1, SAS 2, TRIM and AUTO PLT pushbuttons ON.

(7) Repeat steps (5) and (6) for copilot.

11. Stabilator — CHECK.

a. Indicator should read between 34° and 42° trailing edge down; STABILATOR caution should not appear. STABILATOR AUTO CONTROL pushbutton ON.

WARNING

Helicopter shall not be flown if any part of the stabilator check fails.

Note

Observe plane captain hand signals. If ground crew is unavailable, visually check stabilator after each step.

b. Press the STABILATOR control panel TEST button until stabilator movement stops. Indicator should move 5° to 12° less than in step a. STABILATOR caution appears and MASTER CAUTION warning illuminates. A beeping warning tone sounds in pilot and ATO headsets.

c. STABILATOR AUTO CONTROL pushbutton — ON. Warning tone stops, the stabilator moves to between 34° and 42° trailing edge down and STABILATOR caution disappears.

d. Hold STABILATOR control panel MAN SLEW switch UP until stabilator stops. Stabilator position should indicate between 5° and 10° trailing edge up in 4 to 8 seconds. STABILATOR caution appears, MASTER CAUTION warning illuminates and a beeping warning tone sounds in pilot and copilot headsets. Silence tone as required.

e. Hold MAN SLEW switch DOWN until indicator reads 0°.

f. STABILATOR AUTO CONTROL pushbutton — ON. Indicator moves to between 34° and 42° trailing edge down. STABILATOR caution should not appear.

†12. Rescue Hoist Preoperational Check — AS REQUIRED (see paragraph 7.16.2.1).

†13. Cargo Hook Preoperational Check — AS REQUIRED (see paragraph 7.16.2.2).

7.4.3 Starting Engines and Rotor Engagement

1. High Points and Tail Tiedowns — VERIFY REMOVED.

CAUTION

N_p shaft rub occurs when the engines are online and the rotor brake is released. The N_p shaft impacts the N_g shaft, which causes the compressor blades to impact the compressor casing. Over time, this will cause the engine to lose power and possibly catastrophically fail. The only way to ensure N_p shaft rub will not occur is to use the No Rotor Brake Start Procedure. The No Rotor Brake Start Procedure shall be utilized for routine engine start and rotor engagement ashore.

7.4.3.1 No Rotor Brake Start Procedure

1. Fireguard posted, area clear.
2. Doors, inertia reels — LOCK.
3. SAS 1, SAS 2, TRIM, and AUTO PLT pushbuttons — ON.

WARNING

When AFCS computer power is cycled, trim is disengaged. An unguarded cyclic will allow the rotor arc to dip as low as 4 feet above the ground, without droop-stop pounding, prior to full control deflection.

4. Rotor brake — OFF. Check pressure 0 psi, and ROTOR BRAKE advisory out.
5. ENGINE IGNITION switch — NORM.
6. Fuel selectors — XFD.
7. Lights — AS REQUIRED.
8. Flight controls — POSITION AND HOLD.
   a. Cyclic and pedals — CENTERED.
   b. Collective — DOWN AND HOLD.

CAUTION

During engine start and runup, adjust the cyclic as required to maintain the tip path plane in a neutral position, maintain the collective full down and the pedals centered until N_r reaches 50 percent minimum to prevent damage to anti flap assembly. If droop stop pounding occurs, an cyclic adjustment alone does not alleviate the pounding, then raise collective to alleviate this condition, but not to exceed 1/2 inch. Maintain the new collective position until N_r reaches 50 percent minimum.

9. BACKUP HYD PMP switch — OFF.
10. Engines — START.

CAUTION

- If start is attempted with ENGINE IGNITION switch OFF, do not place switch to NORM until the Abort-Start emergency procedure has been completed. If the ENGINE IGNITION switch is placed to NORM while start is in progress, a hot start may occur.
- If ENG STARTER advisory disappears after advancing the PCL to IDLE, do not reengage the starter due to a possible engine over-temperature.

Note

It is normal for an OIL FLTR BYPASS caution and/or high engine oil pressure to appear when starting an engine below normal operating temperatures because of the relatively high oil viscosity. When the engine oil temperature reaches 38 °C, the caution should disappear.

a. Starter button — Press until N_g increases.

b. TGT — LESS THAN 80 °C.

Note

With certain DECU/VIDS SDC installations, prestart TGT may read a constant 150 °C to 175 °C. This indication is a result of the -71 °C bias in effect when the DECU is powered with 400Hz airframe power. When it is known that the engine is cold, a normal start may be continued. TGT should indicate normally upon engine light off.

c. PCL — IDLE.

d. System indications — CHECK.

Abort start if any of the following indications occur:

(1) N_g does not reach 14 percent within 6 seconds after starter initiation.

(2) No oil pressure within 30 seconds after starter initiation (Do not motor engine).

(3) No light off within 30 seconds after moving PCL to IDLE.

(4) ENG STARTER advisory disappears prior to reaching 52 percent N_g.

(5) TGT reaches 851 °C before idle speed is attained.

CAUTION

If engine experiences a hot start and a subsequent start is attempted, motor the engine for 60 seconds prior to advancing PCL to idle.

Note

If engine fails to start consideration should be given to executing Fuel Priming Checklist (see paragraph 7.17.5).

e. Repeat steps a. through d. for other engine. If conducting crossbleed start (see paragraph 7.17.16.1).

11. Engine oil pressure — CHECK.
12. ENG STARTER advisories — OUT.

Note

Starter normally drops out at 52 percent to 65 percent N_g. If starter does not drop out, perform ENGINE STARTER advisory emergency procedure.

13. Engine Idle N_gs — CHECK, 63 percent or greater and matched within 3 percent.

WARNING

Ground idle N_g split greater than 3 percent is an indication of possible LDS roll pin failure. Do not fly the helicopter until maintenance action is performed.

14. Check #1 HYD PUMP and #2 HYD PUMP cautions — OUT.
15. XMSN oil pressure — CHECK.
16. N_p/N_r — CHECK WITHIN LIMITS.

CAUTION

Loss of the collective boost servo through either intentional shutoff or loss of NO. 2 hydraulic pressure will cause the collective to move rapidly from the down position to the midposition if it is not held by hand. This movement can be enough to cause the helicopter to become airborne. During ground operations with engines operating, the flight controls shall be guarded.

17. PCLs — PULL OUT OF IDLE DETENT AND SMOOTHLY ADVANCE TO FLY.

WARNING

Do not move the PCLs rapidly when the tail wheel lockpin is not engaged.

18. Droop stops — OUT.

Note

If all droop stops are not out by 100 percent N_r, shut down and investigate.

19. PCLs — FLY.
20. Fuel selectors — DIR.
21. BACKUP HYD PMP switch — AUTO.
22. TRQs — MATCHED within 5 percent.
23. N_p/N_r — 100 percent.

WARNING

With rotors turning, all personnel shall enter and exit the rotor arc at the 3 and 9 o'clock positions. Personnel shall enter and exit only upon direction from the plane captain/LSE after clearance is received from the PAC.

24. NO. 1 and NO. 2 GENERATOR switches — ON.

WARNING

Power transfer from the APU generator or external power to the NO. 1 generator may cause disengagement of SAS 1, SAS 2, TRIM, AUTO PLT, and Stabilator. An unguarded cyclic will allow the rotor arc to dip as low as 4 feet above the ground.

25. APU GENERATOR switch — ON (as required).
26. External Power — OFF (as required).

7.4.3.2 Rotor Brake Start Procedures

1. Fireguard posted, area clear.
2. Doors, inertia reels — LOCK.
3. SAS 1, SAS 2, TRIM, and AUTO PLT pushbuttons — ON.

WARNING

When AFCS computer power is cycled, trim is disengaged. An unguarded cyclic will allow the rotor arc to dip as low as 4 feet above the ground, without droop-stop pounding, prior to full control deflection.

4. Rotor brake — CHECK PRESSURE 450 PSI MIN.
5. ENGINE IGNITION switch — NORM.
6. Fuel selectors — XFD.
7. Lights — AS REQUIRED.

8. Flight controls — POSITION AND HOLD AS REQUIRED.
   a. Cyclic and pedals — CENTERED.
   b. Collective — DOWN AND HOLD.

CAUTION

Loss of the collective boost servo through either intentional shutoff or loss of NO. 2 hydraulic pressure will cause the collective to move rapidly from the down position to midposition if it is not held down by hand. This movement can be enough to cause the helicopter to become airborne. During ground operations with engines operating, the flight controls shall be guarded.

9. Engines — START.

CAUTION

- If start is attempted with ENGINE IGNITION switch OFF, do not place switch to NORM until the Abort Start emergency procedure has been completed. If the ENGINE IGNITION switch is placed to NORM while start is in progress, a hot start may occur.
- If ENG STARTER advisory disappears after advancing the PCL to IDLE, do not reengage the starter due to a possible engine over-temperature.

Note

- If the rotor head moves due to rotor brake slippage, the pilot may immediately secure both engines, or if prebriefed, release the rotor brake.
- It is normal for an OIL FILTER BYPASS caution to appear and/or high engine oil pressure when starting an engine below normal operating temperatures because of the relatively high oil viscosity. When the engine oil temperature reaches approximately 38 °C during warmup, the caution should disappear.

   a. Starter button — Press until N_g increases.
   b. TGT — Less than 80 °C.

Note

With certain DECU/VIDS SDC installations, prestart TGT may read a constant 150 °C to 175 °C. This indication is a result of the -71 °C bias in effect when the DECU is powered with 400Hz airframe power. When it is known that the engine is cold, a normal start may be continued. TGT should indicate normally upon engine lightoff.

   c. PCL — IDLE.
   d. System indications — CHECK.

   Abort start if any of the following indications occur:

   (1) N_g does not reach 14 percent within 6 seconds after starter initiation.

   (2) No oil pressure within 30 seconds after starter initiation (Do not motor engine).

(3) No light off within 30 seconds after moving PCL to IDLE.

(4) ENG STARTER advisory disappears prior to reaching 52 percent N_g.

(5) TGT reaches 851 °C before idle speed is attained.

CAUTION

If engine experiences a hot start and a subsequent start is attempted, motor the engine for 60 seconds prior to advancing PCL to idle.

Note

If engine fails to start consideration should be given to executing Fuel Priming Checklist (paragraph 7.17.5).

e. Repeat steps a. through d. for other engine. If conducting crossbleed start (see paragraph 7.17.16.1).

10. Engine oil pressure — CHECK.
11. ENG STARTER advisories — OUT.

Note

Starter normally drops out at 52 percent to 65 percent N_g. If starter does not drop out, perform ENGINE STARTER advisory emergency procedure.

12. Engine idle N_gs — CHECK, 63 percent or above and matched within 3 percent.

WARNING

Ground idle N_g split greater than 3 percent is an indication of possible LDS roll-pin failure. Do not fly the helicopter until maintenance action is performed.

13. Area — CLEAR.
14. Lights — AS REQUIRED.
15. Rotor — ENGAGE.
    a. Rotor brake — OFF. Check 0 psi, and ROTOR BRAKE advisory out.
    b. PCLs — PULL OUT OF IDLE DETENT AND SMOOTHLY ADVANCE TO FLY.

WARNING

Do not move the PCLs rapidly when the tail wheel lockpin is not engaged.

Note

Should conditions dictate, releasing the rotor brake and allowing N_p/N_r to stabilize before advancing the PCLs.

c. CHECK #1 HYD PUMP and #2 HYD PUMP cautions — OUT.

d. XMSN oil pressure — CHECK.

e. Droop stops — OUT.

Note

If all droop stops are not out by 100 percent N_r, shut down and investigate.

16. PCLs — FLY.
17. Fuel selectors — DIR.
18. BACKUP HYD PMP switch — AUTO.
19. TRQs — MATCHED WITHIN 5 PERCENT.
20. N_p/N_r — 100 PERCENT.

WARNING

With rotors turning, all personnel shall enter and exit the rotor arc at the 3 and 9 o'clock positions. Personnel shall enter and exit only upon direction from the plane captain/LSE after clearance is received from the PAC.

21. NO. 1 and NO. 2 GENERATOR switches — ON.

WARNING

Power transfer from the APU generator to the NO. 1 generator may cause disengagement of SAS 1, SAS 2, TRIM, AUTO PLT, and Stabilator. An unguarded cyclic will allow the rotor arc to dip as low as 4 feet above the ground.

22. APU GENERATOR switch — ON (as required).
23. External Power — OFF (as required).

7.4.3.3 Post Engagement Checks

†1. Engine overspeed system and Auto-Ignition — CHECK.

WARNING

Engine overspeed check shall not be performed in flight. Possibility of flameout exists on the engine being checked. Additionally, a popped NO. 1 and/or NO. 2 ENG OVSP circuit breaker shall not be reset in flight. Resetting the circuit breaker may initiate an engine overspeed signal and result in engine flameout.

CAUTION

Engine TGT must be monitored during overspeed test. If TGT rises above 851 °C, shut engine down immediately to avoid over-temperature and perform the Abort Start emergency procedure.

Note

- A failure while testing A or B individually will give the same indications as a normal test of A and B simultaneously.
- When OVSP TEST A and B are pressed simultaneously, the overspeed protection system is operating correctly if an N_g cut-back is noted.
- Failure of an engine to automatically relight when both OVSP TEST A and B are pressed simultaneously is possible. The engine should be restarted using normal procedures and the check should be performed again. If the engine automatically relights on the second attempt, the engine is acceptable. If the engine fails the test twice consecutively, maintenance action is required.
- When pressing OVSP TEST A and B simultaneously, do not press and hold buttons continuously as this may result in a sub-idle relight and engine overtemperature.

a. NO. 1 N_g — NOTE.

b. NO. 1 ENG OVSP TEST A — PRESS AND HOLD.

c. NO. 1 N_g — REMAINS CONSTANT.

d. NO. 1 ENG OVSP TEST A — RELEASE.

e. NO. 1 ENG OVSP TEST B — PRESS AND HOLD.

f. NO. 1 N_g — REMAINS CONSTANT.

g. NO. 1 ENG OVSP TEST B — RELEASE.

h. NO. 1 ENG OVSP TEST A and B — PRESS SIMULTANEOUSLY AND IMMEDIATELY RELEASE. (Note decrease in NO. 1 $N_{g)}$.

i. NO. 1 N_g returns to speed noted in step a.

j. Repeat steps a. through i. for NO. 2 engine.

†2. Contingency power — CHECK.

a. Pilot CONTGCY PWR switch — ON.

b. Confirm normal engine parameters; #1 and #2 ENG CONTGCY PWR ON advisories, ECS SHUTDOWN caution (if ECS operating), and MASTER CAUTION lights appear.

c. Pilot CONTGCY PWR switch — OFF. Advisories and caution disappear.

Note

Upon selecting CONTGCY PWR, a rapid change in TGT may be indicative of an engine control system malfunction.

d. Repeat steps a. through c. for copilot CONTGCY PWR switch.

†3. Hydraulic leak test — CHECK.

a. Flight controls — LEFT PEDAL SLIGHTLY FORWARD OF NEUTRAL.

b. HYD LEAK TEST switch — TEST. #1 TAIL RTR SERVO, BOOST SERVO OFF, SAS, AFCS DEGRADED, #1 RSVR LOW, #2 RSVR LOW, and BACK-UP RSVR LOW cautions appear and MASTER CAUTION warning illuminates. BACK-UP PUMP ON and #2 TAIL RTR SERVO ON advisories appear. During this check, it is normal for collective and tail rotor pedals to move slightly.

c. HYD LEAK TEST switch — RESET.

d. Associated cautions and advisories — Disappear. BACKUP PUMP ON advisory remains for approximately 90 seconds or until cycled OFF.

e. BACKUP HYD PMP switch — CYCLE, OFF THEN AUTO.

†4. Backup tail rotor servo — CHECK.

a. Flight controls — LEFT PEDAL SLIGHTLY FORWARD OF NEUTRAL.

b. TAIL SERVO switch — BKUP. #1 TAIL RTR SERVO caution appears, #2 TAIL RTR SERVO ON and BACK-UP PUMP ON advisories appear within 0.5 seconds.

c. TAIL SERVO switch — NORM. #1 TAIL RTR SERVO caution and #2 TAIL RTR SERVO ON advisory disappear. BACK-UP PUMP ON advisory remains for approximately 90 seconds or until cycled OFF.

d. BACKUP HYD PMP switch — CYCLE, OFF THEN AUTO.

5. Engine anti-ice check — AS REQUIRED (see paragraph 7.17.10).

6. Blade de-ice systems check — AS REQUIRED (see paragraph 7.17.9).

7. HIT check — AS REQUIRED (see paragraph 7.17.1).

8. ENGINE ANTI-ICE, PITOT HEAT, BLADE DE-ICE, WINDSHIELD ANTI-ICE, DE-ICE MASTER switches — AS REQUIRED.

9. FMCP — AS REQUIRED.

10. APU — SHUTDOWN.

a. AIR SOURCE ECS/START switch — ENG.

b. APU CONTR switch — OFF.

c. FUEL PUMP switch — OFF.

7.4.4 Mission/Weapons System Checklist

1. MSN PWR — PRI.

2. DPLR, RDR, DATA LINK — AS REQUIRED.

3. ALQ-205 — AS REQUIRED.

4. AAR 47 — AS REQUIRED (2-minute warm-up).

†5. Mission systems — IPL and key.

a. SO — IPL.

b. ATO MPD — TEST.

c. Secure equipment — KEY.

d. ATO MPD — ON (after test pattern appears).

e. Secure communications — CHECK.

6. Mode select panels, BDHI, AI — AS REQUIRED.

7. BDHIs and AIs — CHECK.

†8. TACAN/IFF — TEST, Set.

a. TACAN check:

(1) Ensure the TACAN has warmed up for 90 seconds.

(2) Select TCN on BDHI mode select panel.

(3) Adjust BDHI CRS control for a course of 180° or 000°.

(4) Set TACAN control mode selector to T/R.

Note

A partial test of the TACAN may be accomplished while the mode select switch is in the REC position. However, the transmitter (DME) functions are not fully tested.

(5) Momentarily press TACAN TEST button and observe BDHI and TEST indicator for the following:

(a) TEST indicator flashes momentarily indicating TEST indicator is operational.

(b) Distance shutter and NAV flag on BDHI come into view for approximately 15 seconds, if not already in view.

(c) Distance shutter and NAV flag go out of view.

(d) Distance indication is 000.0 ±0.5 nm and bearing indication is 180 ±3°. A distance indication of 399.9 is equal to a negative 0.1 nm, and a distance indication of 399.5 is equal to negative 0.5 nm. The 399.9 to 399.5 indications are not malfunctions, but an indication of negative distance.

(e) Course deviation indicator is centered within ±1/2 dot and TO/FROM indicator indicates TO (if a course of 180° is selected) or FROM (if a course of 000° is selected).

(f) Distance shutter and NAV flag come into view until the system reacquires a usable signal.

(g) Observe TEST indicator. If indicator illuminates during test and remains illuminated, there is a TACAN system malfunction and all information should be disregarded until repairs are made.

b. IFF check:

(1) MASTER — NORM.

(2) Individual mode switches — TEST; Verify steady green light.

(3) MASTER — STBY.

Note

- IFF Mode 4 may also be tested by placing the mode 4 TEST/ON/OUT switch to the TEST position.
- If Mode 3/A or Mode C fails, IFR flight under ATC control is not permitted.

(4) Codes — AS REQUIRED.

9. AOP — INITIALIZE.

†10. NAV — INITIALIZE.

If GPS is to be used as a the primary navigation mode:

a. GPS — KEY.

b. GPS — INIT/TEST (via equipment status table once GPS is available).

CAUTION

Options 1 (Get GPS PRESET) and 8 (Send Init Data) of the GPS Data Table should not be performed when the aircraft NAV mode is GPS, as large and unpredictable aircraft LAT/LONG errors may occur.

Note

Performance of INIT SYNC to initialize the GRP is strongly recommended. This will avoid problems such as uncapturable fly-to points. See NTRP 3-22.2-SH60B for establishing a data link with the ship.

†11. Initialize FHS — AS REQUIRED.

a. FLIR EU PWR — ON.

WARNING

When the FLIR EU PWR switch is ON, the FLIR Turret automatically moves to the STOW position. Ensure personnel and equipment are clear of the FLIR Turret area before applying power.

b. Hellfire PWR — ON (as required)

c. ACRT/FLIR/M299 — INIT/TEST (via equipment status table).

d. FLIR Turret — VERIFY OPERATION.

e. Hellfire Attack Menu — SELECT. Verify correct missile symbology.

If missile symbology incorrect:

f. RESET LAUNCHER — SELECT.

g. FLIR Turret — STOW.

h. Hellfire PWR — OFF.

12. RAD ALTs — TEST. Press and hold the RAD ALT PUSH-TO-TEST (PTT) button.

Note

Note altitude indicator pointers indicate 100 ±10 feet, the green self-test light illuminates, and aural radar altitude warning system (RAWS) tone heard in pilot and ATO headsets. Release the PTT button and indicator should return to zero.

13. EMCON, as required:

a. Transponder - Unnecessary modes — OFF (as required).

b. TACAN — AS REQUIRED.

c. Data link — AS REQUIRED.

d. Radar altimeter — AS REQUIRED.

14. External power/Data link hardwire — DISCONNECT (as required).

15. Ordnance pins/covers — REMOVE (as required).

a. ALE-39 external arming handles (ESP only) — AS REQUIRED.

b. AGM-114 Hellfire missile seeker head cover(s) — REMOVE.

c. Mk46 REXTORP/EXTORP nose cover, air stabilizer clamp, ballast safety strap — REMOVE.

d. Mk 46 WARSHOT nose cover, air stabilizer clamp — REMOVE.

e. Mk 50 nose cover — INSTALLED.

f. Mk 50 WARSHOT ARM/SAFE indicator — ARM.

WARNING

Inadvertent launch of chaff/flares may occur from the ALE-39 when the external arming handles are in the ARM position regardless of the position of the SAFE/ARM switch on the arming control panel.

SEE IC # 70

7.5 TAXI CHECKLIST

1. Crew — SET FOR TAXI.
2. Lights — AS REQUIRED.
3. Ordnance/Pins/Covers — ARM/REMOVE (as required).
4. Chocks — OUT.

WARNING

With missiles uploaded, exercise extreme care when chocking and chaining to avoid damage to missile seeker, fins, or injury to personnel.

5. Brakes — RELEASE AND CHECK.
6. TAIL WHEEL switch — UNLOCK.
7. BDHI, standby compass, AIs, turn and slip — CHECK.

7.6 TAKEOFF CHECKLIST

1. Lights — AS REQUIRED.
2. AFCS — AS REQUIRED.
3. STABILATOR AUTO CONTROL pushbutton — ON.
4. CONTGCY PWR switch — AS REQUIRED.
5. PCLs — FLY.
6. Instruments, Caution/Advisories — CHECK.
7. Communication and navigation — AS REQUIRED.
   a. Transponder — AS REQUIRED.
   b. TACAN — AS REQUIRED.
8. FLIR turret — STOW, AS REQUIRED.
9. TAIL WHEEL switch — LOCK.
10. HARNESS — LOCKED.
11. Aircrewman Pretakeoff Checklist — COMPLETE.
12. Ordnance/Pins/Covers — ARM/Remove (as required).
13. Chocks/Chains (Main, High Points, and Tail) — REMOVED.

WARNING

With missiles uploaded, exercise extreme care when chocking and chaining to avoid damage to missile seeker, fins, or injury to personnel.

14. Brakes — AS REQUIRED.
15. RDR/BAR ALT pushbutton — AS REQUIRED.

Note

Do not engage RDR ALT HOLD until clear of deck edge.

7.7 POST TAKEOFF CHECKLIST

1. Instruments, Caution/Advisories — CHECK.
2. RDR/BAR ALT pushbutton — AS REQUIRED.
3. CONTGCY PWR switch — AS REQUIRED.
4. Lights — AS REQUIRED.
5. Aircrewman Post Takeoff Checklist — COMPLETE.
6. COMP controllers — SLAVED and ALIGNED.
7. Manual fuel transfer — CHECK (as required). (Short manual transfers from each auxiliary fuel tank should be checked. Main fuel level shall be 3,700 pounds or less prior to each transfer.)
8. HIT check — AS REQUIRED (see paragraph 7.17.1).

Note

At a minimum, the HIT check shall be performed on the first flight of the day.

9. Engine anti-ice check — AS REQUIRED (see paragraph 7.17.10).
10. Power Available — CHECK (as required).
    a. ECS/ANTI-ICE and CONTGCY PWR switches — OFF.
    b. Stabilize aircraft at intended operating altitude, level the VSI, ball centered, 100 to 130 KIAS. Airspeed is dependent on environmental conditions and gross weight.
    c. Gradually increase collective until N_p begins to droop on either engine or maximum dual-engine torque limits are reached. Stabilize for 5 seconds and record indicated torque.
11. Tactical/Combat Checklist — AS REQUIRED (see paragraph 7.8).

7.8 TACTICAL/COMBAT CHECKLIST

1. Fuel — Check mission capable and bingo.
2. CONTGCY PWR — AS REQUIRED.
3. Fire power/weapons check.
    a. Machine gun — RIG AND TEST FIRE (as required).
    b. FLIR — AS REQUIRED.
    c. Hellfire system — ON; check ACRT/SDC/missile status.
    d. LASER — ENABLE (if required).
    e. Torpedoes and missiles checklist — PERFORM (as required).
    f. Sonobuoy inventory — CHECK.

4. Emitters/EMCON.
   a. Radar — AS REQUIRED.
   b. IFF unnecessary modes — OFF.
   c. TACAN — AS REQUIRED.
   d. Data link — AS REQUIRED.
   e. MAD — AS REQUIRED.
   f. Doppler — AS REQUIRED.
   g. Radar altimeter — AS REQUIRED, variable index as required.
   h. BARALT HOLD — ENGAGE IF REQUIRED.
   i. External lights — AS REQUIRED.
   j. Internal lights — SELECT MINIMUM INTENSITY (as required).
5. Navigation.
   a. Sensor horizon RADAR or MAD — AS REQUIRED.
   b. SO/ATO option controls — SET (as required).
6. Communications — CHECK (as required).
7. Electronic Countermeasures.
   a. AAR-47 — Verify ON.

Note

Inadvertent firing of chaff/flares may occur if the ALE-39 is armed prior to applying power to the AAR-47.

   b. ALQ-205 — AS REQUIRED.
   c. ALE-39 programmer — Check settings.
   d. Chaff dispenser control panel — AS REQUIRED.
   e. Countermeasure dispenser control panel — ON; check settings.
   f. Arm control indicator unit — ARM.

Do not arm the ALE-39 system until clear of ship/takeoff environment. Inadvertent firing of chaff/flares is a potential danger to ground personnel and property.

   g. ESM — Update library; set HTW.

7.9 RETURN TO FORCE CHECKS

1. MASTER ARM — SAFE.
2. LASER — DISABLE.
3. HELLFIRE PWR — OFF.
4. Machine gun — CLEAR, SAFE, AND STOW.
5. AAR-47 — OFF.
6. ALE-39 — SAFE.
7. ALQ-205 — OFF.
8. Transponder modes 1, 2, 3, 4, and C — ON (as required).
9. External lights — ON (as required).
10. Radar altimeter — ON.
11. RADALT hold — AS REQUIRED.
12. DPLR — ON.
13. TACAN — T/R.
14. Radar — AS REQUIRED.
15. MAD — STOW.

7.10 LANDING CHECKLIST

1. CONTGCY PWR switch — AS REQUIRED.
2. Lights — AS REQUIRED.
3. Brakes — AS REQUIRED.
4. TAIL WHEEL switch — LOCK.
5. Instruments, Caution/Advisories — CHECK.
6. BAR ALT/RAD ALT — AS REQUIRED.
7. HF Radio — OFF.
8. Armament — SAFE.
9. Harness — LOCKED.
10. Aircrewman Landing Checklist — COMPLETE.
11. FLIR — STOW.
12. Return to Force Checks — AS REQUIRED.

7.11 POST LANDING CHECKLIST

1. Lights — AS REQUIRED.
2. Tail Wheel/Brakes — AS REQUIRED.
3. CONTGCY PWR switch — OFF.
4. Ordnance pins/covers — DE-ARM/SAFE/INSTALL (as required).

CAUTION

Install Hellfire missile seeker covers (if available) before all ground operations and before all chock and chain operations.

5. ALE-39 External Arming handles — SAFE.
6. M299 launcher SAFE/ARM switch — SAFE.
7. Chocks and Chains — AS REQUIRED.

WARNING

With missiles uploaded, exercise extreme care when chocking and chaining to avoid damage to missile seeker or fins or injury to personnel.

8. Transponder — STBY.
9. ENG ANTI-ICE/PITOT HEAT/BLADE DE-ICE — OFF.

WARNING

The pitot and static ports become extremely hot during operation. Care should be taken to prevent ground personnel from touching these surfaces. Failure to turn off pitot heat could burn personnel whenever external power is applied.

7.11.1 Hot Refuel Checklist

1. RADIOS — MONITOR; transmit only for essential communications.
2. RADALT — OFF.
3. DOPPLER — OFF.
4. TACAN — RECEIVE.
5. HF — OFF.
6. IFF — STANDBY.
7. FMCP — AS REQUIRED.
8. PRE-CHECK switches — AS REQUIRED.
9. Fuel quantity — MONITOR.

At completion of fueling:

10. FMCP — AS REQUIRED.
11. RADALT, DOPPLER, TACAN, HF, IFF — AS REQUIRED.

7.12 SHUTDOWN

1. TAIL WHEEL switch — LOCK.
2. Parking brake — SET.
3. Chocks — IN.
4. APU — START.
   a. ECS — OFF.
   b. AIR SOURCE ECS/START switch — APU.

c. FUEL PUMP switch — APU BOOST.

d. APU CONTR switch — ON.

5. APU GENERATOR switch — ON.
6. IFF MODE 4 CODE — HOLD (as required).
7. Avionics.
   a. DOPPLER — OFF.
   b. MPDs — OFF.
   c. SAC POWER — OFF.
   d. FLIR POWER — OFF.
   e. MSN POWER — OFF.
   f. RDR — STBY.
   g. DATA LINK — STBY.
   h. TACAN — OFF.
   i. IFF MASTER — OFF.
   j. RAD ALTs — OFF.
8. BACKUP HYD PMP switch — ON.
9. Flight controls — POSITION AND HOLD (as required).
10. NO. 1 and NO. 2 GENERATOR switches — OFF.

WARNING

Power transfer from Main Generators or External Power to the APU generator may cause disengagement of SAS 1, SAS 2, TRIM, and Stabilator. An unguarded cyclic will allow the rotor arc to dip as low as 4 feet above the ground.

11. ENGINE IGNITION switch — OFF.
12. Lights — AS REQUIRED.
13. PCLs — IDLE.

CAUTION

Engines should be cooled for 2 minutes at an N_g of 90 percent or less before moving PCLs to OFF. If an engine is shut down without being cooled, it should not be restarted for 4 hours unless restart is performed within 5 minutes.

14. NO. 2 PCL and fuel selector — OFF.
15. Droop stops — IN.
16. NO. 1 PCL and fuel selector — OFF.
17. Rotor brake — ON (between 30 percent and 50 percent N_r).

18. GT — MONITOR.

CAUTION

If TGT rises above 540 °C, perform Post Shutdown Engine Fire emergency procedure.

19. DECU codes — CHECK.
20. Engine cleaning — AS REQUIRED (see paragraph 7.17.12).

Note

If engine cleaning is required, proceed to step 14. of Engine Cleaning Procedures.

21. Blade fold — AS REQUIRED.

CAUTION

- Should the blade fold system stall during fold, cycling the BLADE FOLD switch to SPREAD should return the rotor blades to the spread position.
- Shut down the APU immediately if a rotor blade remains stalled in the APU exhaust.
- When the ROTOR SPREAD light is not illuminated, pressing the RDR ALT pushbutton during blade fold system operations may cause failure of the automatic system. Do not press this pushbutton during blade fold operations.
- Simultaneous folding of main rotor blades and tail pylon is prohibited.

Note

Failure to suppress the DECU numerical fault codes on the PDU will prevent the automatic blade fold from operating due to the torque signal being relayed to the AFCS computer. Codes can be suppressed by pressing either OVSP TEST A or B buttons for the affected engine.

a. Area — CLEAR (wing walkers positioned, as required).
b. BACKUP HYD PMP switch — ON.
c. STABILATOR AUTO CONTROL pushbutton — OFF.
d. SAS 1 and SAS 2 pushbuttons — OFF, TRIM pushbutton — ON, AUTO PLT pushbutton — OFF.
e. SERVO switch — 1ST OFF or 2ND OFF.
f. BLADE FOLD MASTER switch — ON.
g. BLADE FOLD switch — FOLD.
h. Rotor brake — OFF.
i. ROTOR INDEXED light — ILLUMINATED.

Note

Blades may be manually indexed if the main rotor indexer gust lock fails. Cycling the BLADE FOLD switch OFF, pulling the RTR HEAD INDEX MOTOR circuit breaker (NO. 2 AC PRI, CABIN), and cycling the BLADE FOLD switch to FOLD may disengage the indexer. Rotate the rotor system until the INDEXED light illuminates, then continue with the Blade Fold Checklist.

j. Rotor brake — APPLY.

k. BAR ALT — FLASHING.

l. Collective, cyclic, and pedals — FREE TO POSITION.

Note

If computer is unable to null after 30 seconds, the AFCS DEGRADED caution will appear. To attempt another cycle, turn BLADE FOLD switch OFF, press any FAIL ADVISORY MODE RESET pushbutton, and repeat blade fold sequence.

m. BAR ALT pushbutton — PRESS.

Note

The following blade status panel light sequence indicates proper operation of the fold cycle: TRIM light flashing (blades positioned for pitch lock insertion) and PITCH LOCKED light illuminated (last pitch lock in). Blades will begin folding following the illumination of the PITCH LOCKED light. Should the INDEXED light flicker or extinguish during folding (indicating a loss of index), the blade fold sequence will stall. Cycling the BLADE FOLD switch to SPREAD should clear the stall. When the SPREAD light illuminates, the rotor head may be re-indexed and another fold cycle attempted.

n. ROTOR FOLDED light — ILLUMINATED.

o. BLADE FOLD switch — OFF.

p. BLADE FOLD MASTER switch — OFF.

q. SERVO switch — CENTER.

22. BACKUP HYD PMP switch — OFF.

23. ECS — OFF.

24. Interior/Exterior/NVD lights — OFF.

25. APU GENERATOR switch — OFF.

26. APU — SHUTDOWN.

    a. AIR SOURCE ECS/START switch — OFF.

    b. APU CONTR switch — OFF.

    c. FUEL PUMP switch — OFF.

27. BATT switch — OFF.

7.13 POST FLIGHT CHECKS

1. Interior equipment.
2. Tires/struts.
3. Leaks.
4. Missing panels.

7.14 NVD LIGHTING CHECKLIST

1. CDU, PDU, and master caution panel filters — Installed.
2. RADALT — Green.
3. Master warning panel — Down.
4. AAR-47 indicator lights — Out.
5. IFF test/no go catseye lights (red/green) — Closed.
6. BLADE DE-ICE catseye lights (2 amber/1 green) — Closed.

Note

ALQ-205 must remain uncovered for 15 minutes to allow cooldown.

7. Anticollision lights — As required (off for shipboard takeoff/landing).
8. Position lights — As required.
9. RAST lights — As required (on for FD/RA landings).
10. Infrared searchlight — As required.
11. Instrument panel secondary lights — ON.
12. Lower console secondary lights — Bright.
13. Utility lights — ON/green.
14. AUX fuel totalizer — Covered.
15. ASE status lights — Covered.
16. CSCG status annunciators — Covered.
17. Armament control panel switches (AN/ASQ-198) — Covered.
18. Wet compass lighting — OFF.
19. Nonflight instrument lights — OFF.
20. Pilot/ATO flight instrument lights — OFF.
21. Upper/lower console panel lights — OFF.
22. Aided cockpit lighting evaluation — Conduct.

7.15 WHITE LIGHTING CHECKLIST

1. CDU, PDU, and master caution panel filters — Removed.
2. RADALT — Red.
3. Master warning panel — Up.
4. AAR-47 indicator lights — In.
5. Wet compass — ON.
6. IFF test/no go catseye lights (red/green) — Open.
7. BLADE DE-ICE catseye lights (2 amber/1 green) — Open.

8. Anticollision lights — ON.
9. Position lights — ON.
10. RAST lights — As required (on for FD/RA landings).
11. Infrared searchlight — OFF.
12. Instrument panel secondary lights — As desired.
13. Upper/lower console panel lights — ON.
14. Lower console secondary lights — OFF.
15. Pilot/ATO flight instrument lights — ON.
16. Nonflight instrument lights — ON.
17. Utility lights — As desired.
18. AUX fuel totalizer — As desired.
19. ASE status lights — As desired.
20. CSCG status annunciators — Uncovered.
21. Armament control panel switches (AN/ASQ-198) — As desired.

7.16 AIRCREWMAN'S CHECKLISTS

7.16.1 Aircrewman Prestart Checklist

1. CLOCK — WIND, SET.
2. RADIO panel — SECURE.
   a. Switches — AS DESIRED.
   b. UHF 1 and 2 receivers — AS REQUIRED.
   c. D/L — AS REQUIRED.
   d. SONO — OFF.
   e. TACAN — OFF.
   f. HF — OFF.
3. MAD detecting set control box — SECURE.
   a. PWR — OFF.
   b. UNIT 1 mechanical fault indicator — BLACK.
   c. ALT COMP — OFF.
   d. CAL — OFF.
   e. BAND PASS — Low 0.04, high 0.6.
   f. γ FS — TST
4. MAD reeling machine control panel — SECURE.
   a. POWER — OFF.
   b. REEL — CENTERED.
   c. REEL FAIL mechanical fault indicator — BLACK.
5. System control panel — SECURE.
   a. PANEL — OFF.
   b. PROGRAM MODE — AOP.

c. SAC MODE — PRIME.

d. PROC INTRPT — OFF.

Note

To restart SACs, place SAC 1 and SAC 2 MASTER CLR in OFF position.

e. SAC 1 POWER — OFF.

f. MASTER CLR — ON.

g. SAC 2 POWER — OFF.

h. MASTER CLR — ON.

i. IPL THP — 1.

j. IPL SAC — 2.

k. IPL LOAD — OFF.

6. RAST panel — SECURE.
   a. MASTER — OFF.
7. FLIR controls.
   a. FLIR PWR — OFF.
   b. LASER — DISABLE.
   c. GIMBAL — DISABLE.
8. RADAR/DISPLAY panel — SECURE.
   a. MODE/SPEED — OFF.
   b. EMISSION — HOLD.
   c. RCVR GAIN — 1.
   d. FORMAT — TEST.
   e. STAB — N.
   f. RANGE — 10.
   g. PERSIST — OFF.
9. MPD — OFF.
10. PANEL INTENSITY — CCW.
11. STATUS INTENSITY — CCW.
12. Floodlights — OFF.
13. Lower sensor operator console (applies to ESP-equipped aircraft only).
    a. ALQ-205 control panel — SECURE.
       (1) POWER — OFF.
    b. CM select panel — SECURE.
       (1) CM select — AS DESIRED.
    c. AN/ALE-39 control panel — SECURE.
       (1) POWER — OFF.
       (2) Payloads remaining/mode select — AS DESIRED.

d. DISP ARM panel — SECURE.
   (1) ARM/SAFE — SAFE.
e. AN/ALE-39 programmer — SECURE.
   (1) Thumbwheels — AS DESIRED.
f. CM DIMMER CONT panel — SECURE.
   (1) Control knob — AS DESIRED.
g. ECM control panel — Secure.
   (1) POWER — OFF.
   (2) PUSH FOR STANDBY STATUS — DEPRESSED.
   (3) TEST FLARE — OFF/guard closed.
h. Countermeasures circuit breaker panel — SECURE.
   (1) Circuit breakers — CHECK.

14. Seats and belts — ADJUSTED/LOCKED.
15. Prestart Checklist — COMPLETE (report when requested).

7.16.2 Aircrewman's Utility Systems Checks

7.16.2.1 Rescue Hoist Preoperational Check

1. Rescue station ICS — ADJUST.
2. BACKUP PUMP — VERIFY ON.
3. RESCUE HOIST — ALL.
4. HOIST PWR light — VERIFY ON.

CAUTION

Tension should be maintained on the hoist cable to prevent possible birdcaging.

5. Rescue hook — LOWER.
6. Rescue hook — Operational/rotates freely.
7. Bushing guide — Set screws/cotter pins (Breeze Eastern hoists only).
8. Bumper assembly — Grommet/cable beneath (Breeze Eastern hoists only).
9. Hoist cable — No kinks/broken strands.
10. Lower/raise hoist at all electrical stations. Select BACKUP — Check for light and ability to lower/raise hoist — DESELECT.
11. Rescue hook — ELECTRICALLY STOW.
12. Report hoist status — "CHECKS GOOD/BAD ALL STATIONS".
13. RESCUE HOIST — OFF.

14. HOIST PWR light — VERIFY OFF.
15. BACKUP HYD PUMP — AS REQUIRED.

WARNING

Personnel hoisting shall not be attempted with a damaged cable.

7.16.2.2 Cargo Hook Preoperational Check

1. Cargo hook — OPERATIONAL POSITION.
2. CARGO HOOK ARMING switch — ARM.
3. CARGO HOOK EMERGENCY RELEASE switch — NORMAL.
4. CARGO HOOK CONTROL switch — ALL.
5. Report ready for cargo hook check.
6. Apply downward pressure to cargo hook jaw.
7. Pilot — Press CARGO RELEASE.
8. Hook open — Verify CARGO HOOK OPEN advisory light ON.
9. Close hook — Verify CARGO HOOK OPEN advisory light OFF.
10. Repeat steps 6. through 9. for ATO and crewman.
11. Cargo hook manual release — CHECK.
12. CARGO HOOK EMERGENCY RELEASE switch — OPEN.
13. CARGO HOOK ARMING switch — SAFE.
14. Cargo hook — STOWED.
15. Report cargo hook check — COMPLETE.

7.16.3 Aircrewman Pretakeoff Checklist

1. HELLFIRE PWR — VERIFY OFF.
2. STATUS INTENSITY — AS DESIRED.
3. PANEL INTENSITY — AS DESIRED.
4. MPD — TEST.
5. Initialize SYSTEM CONTR panel.
   a. SYSTEM CONTR PANEL — LAMP TEST. Verify all status annunciators illuminated.
   b. SYSTEM CONTR PANEL — RESET.
      (1) Verify all status annunciators — OFF.
      (2) Release switch.
      (3) Verify SAC-1 and SAC-2 POWER FAULT annunciators illuminated.
6. SAC POWER.
   a. SAC-2 POWER — ON.
   b. SAC-1 POWER — ON.
7. MPD — ON; RASTER — ADJUSTED.

8. Load SAC-2 — AS REQUIRED.
   a. IPL LOAD — ON.
   b. SAC-2 MASTER CLR — OFF.
   c. Verify IPL IN PROG annunciator illuminates.
   d. IPL LOAD — OFF.
9. MAGNETIC DETECTING SET PWR — ON.
10. MAD reeling machine POWER — ON.
    a. VEHICLE TRAIL light — TEST.
    b. CABLE LIMIT light — TEST.
    c. MAD reeling machine POWER — OFF.
11. Radar/display panel.
    a. MODE/SPEED — AUTO.
12. RAST.
    a. Lamp TEST.
       (1) RAST panel power — ON.

Note

Maintain power to light for 5 minutes to properly energize luminescent hose on messenger cable.

    b. RAST MSGR LGHT — AS REQUIRED.
13. HEELS — ARM.

Note

Steps 13. and 14. apply to HEELS-equipped aircraft only.

14. HEELS TEST — NOT ILLUMINATED.
15. Keyset — LAMP TEST.
16. Verify SAC-2 LOAD — COMPLETE.

For aircraft equipped with 99-channel sonobuoy receivers:

    a. If using THP 20 or previous, sonobuoy receiver circuit breakers — Pull.
    b. If using THP 21 or subsequent, sonobuoy receiver circuit breakers — In.

17. Load SAC-1 — AS REQUIRED.

Note

SAC-2 IPL will occasionally fail if the spectrum analyzer (SA) is already loaded. To avoid SAC IPL failure, cycle SA power or MSN PWR to SEC and back to PRI before performing SAC IPL.

    a. IPL SAC switch — 1.
    b. IPL LOAD — ON.

c. SAC-1 MASTER CLR — OFF.

d. Verify IPL IN PROG annunciator illuminates.

e. IPL LOAD — OFF.

f. Verify SAC-1 LOAD — COMPLETE.

g. Verify all annunciators extinguished and report — “IPL COMPLETE”.

18. Data link — Verify KG-45 LOAD STATUS.

Note

Equipment status table D/L BIT status word 1 (word 2 for THP 21 and subsequent) high order digit EVEN (XXXX) implies KG-45 passed BIT and code was accepted. Devices shown on the Equipment Status Table that are not in the aircraft (e.g., FLIR, RDP, MLA, GPS) should be I/O inhibited.

19. Initialize FHS — AS REQUIRED.

a. FLIR PWR — ON (if applicable).

When the FLIR PWR switch is ON, the FLIR turret automatically moves to the STOW position. Ensure personnel and equipment are clear of the FLIR turret area before applying power.

Note

After power on, an A/C 1553 FAIL alert is displayed. This is a normal indication that the FLIR is conducting the BIT.

b. HELLFIRE PWR — ON (if applicable).

c. Initialize FLIR — AS REQUIRED.

d. LASER — DISABLE.

e. GIMBAL — ENABLE.

f. Verify FLIR video displayed on MPD.

Note

FLIR video may take up to 10 minutes to be displayed on the MPD.

g. Slew FLIR turret to ensure turret gimbal is enabled.

h. Attack page — SELECT (if applicable).

i. Launcher — RESET (if applicable).

j. Launcher and missile status — VERIFY (if applicable).

k. HELLFIRE PWR — OFF.

l. FLIR turret — STOW.

m. FLIR VCR POWER — ON (if applicable).

n. FLIR VCR — Set date and time.

o. FLIR VCR time set to 2 h or 6 h.

p. FLIR VCR tape — INSERT (as required).

20. GPS Key — VERIFY LOAD STATUS/INIT TEST via EQUIPMENT STATUS TABLE.
21. Device reinitialization — AS REQUIRED.
    a. Monitor equipment status.
    b. Select lines/options desired.
    c. Repeat as necessary.
22. SO ORT — PERFORM.

Note

- If it is necessary to transmit the antisubmarine warfare (ASW) ORT acoustic data to the ship, the SO must ask the ATO to select Helo Control ASW mode for data link.
- If it is necessary to transmit the RADAR/CMUX test results to the ship, the SO must ask the ATO to select Helo Control ASST mode for the data link.

23. SO table — UP/LOCKED.
24. SONO launcher lockout pin — FREE.
25. AAR-47 — ON (2-minute warmup).
26. ALQ-205 — AS REQUIRED.
27. Seat/harness — UP/LOCKED.
28. Aircrewman Pretakeoff Checklist — "COMPLETE" (report when requested).

7.16.4 Aircrewman Post Takeoff Checks

1. MAIN PROBE — UP.
2. MSGR LGHT — OFF.
3. RAST panel power — OFF.
4. Aircrewman After-Takeoff Checklist — "COMPLETE" (report when requested).

7.16.5 Aircrewman Before Landing Checklist

1. FLIR — STOW.
2. LASER — DISABLE.
3. HELLFIRE PWR — OFF (if applicable).
4. Machine guns — CLEAR, SAFE AND STOW.
5. MAD — STOWED.
    a. REEL switch — CENTERED.
    b. MAD reeling machine power — OFF.
6. MAGNETIC DETECTING SET PWR — AS REQUIRED.
7. Radar display controls.
    a. EMISSION — HOLD.
8. ALQ-205 — OFF.

9. ALE-39 — SAFE.

Note

To properly safe the ALE-39 system, ensure the Control Indicator ARM/SAFE switch is set to SAFE and the countermeasures dispenser control panel SALVO FLARE switch is set to OFF at the SO station.

10. AAR-47 — OFF.
11. RAST.
    a. Panel power — AS REQUIRED.

Note

Energize the messenger light a minimum of 2 minutes prior to paying out the messenger cable.

    b. MSGR LIGHT power — AS REQUIRED.
12. MAIN PROBE — AS REQUIRED.
13. Seat/harness — UP/LOCKED.
14. SO table — UP/LOCKED.
15. Aircrewman Before Landing Checklist — "COMPLETE" (report when requested).

7.16.6 RAST Recovery Checklist

1. Messenger cable — Lower when directed.
2. Messenger cable — Stop lowering when directed.

WARNING

Too much slack in the messenger cable may entangle flight deck personnel. If a STOP LOWERING command is not received from the LSO after 20 seconds, stop lowering the messenger cable and verify the cable status.

3. Messenger cable — Raise when directed.
4. Report to pilot — "THREE GREEN".

7.16.7 Aircrewman Post Landing Checks

1. Radar MODE/SPEED — OFF.
2. FLIR system.
   a. FLIR PWR — OFF.
   b. VCR TAPE — EJECT.
   c. VCR PWR — OFF.
   d. GIMBAL — DISABLE.
3. MPD — OFF.
4. RAST.
   a. MSGR LGHT power — AS REQUIRED.
   b. RAST panel — OFF when H'DOWN CABLE OUT light comes ON.

5. Sonobuoy launcher.
   a. VNT indication.
   b. Valve safety lockout — LOCK (FREE position if no sonobuoys installed).
6. ALE-39 arming handles — SAFE.
7. M299 launcher SAFE/ARM switch — SAFE (if applicable).
8. Ordnance pins/covers — On (if available).

WARNING

With missiles uploaded, exercise extreme care when chocking and chaining to avoid damage to missile seeker or fins or injury to personnel.

9. System control panel.
   a. SAC-1 POWER — OFF.
   b. SAC-2 POWER — OFF.
10. MAGNETIC DETECTING SET PWR — OFF.
11. HEELS — DISARM (if applicable).
12. RAST MASTER — ON.
13. MAIN PROBE — AS REQUIRED.

Note

ALQ-205 must remain uncovered for 15 minutes to allow cooldown.

14. Aircrewman Post Landing Checklist — "COMPLETE" (report when requested).

7.16.8 Aircrewman Post Flight Checklist

1. SO station.
   a. All switches — OFF/normal.
   b. DOME LIGHTS — OFF.
   c. Utility light — OFF.

Note

The utility lights operate from the battery utility bus. A dead battery may result from not placing the utility light switch in the OFF position.

2. Loose equipment — STOWED/SECURE.
3. FOD — REMOVED.
4. Discrepancies — NOTED/REPORTED.
5. Debrief — WHEN REQUIRED.

7.17 SPECIAL PROCEDURES

7.17.1 Health Indicator Test (HIT) Check

Note

- If icing conditions exist, consideration should be given to performing HIT Check on deck.
- HIT Check shall be performed on the first flight of the day and recorded on locally reproduced copies of Figure 10-3 for trends in engine performance.

1. ENG ANTI-ICE switches — OFF.

CAUTION

If icing conditions exist, do not keep engine anti ice off longer than necessary to perform check.

2. ECS — OFF.
3. BAR ALT — SET TO 29.92.
4. N_r — 100 PERCENT.
5. PCL (Engine not being checked) — IDLE, if performing HIT check on ground.
6. Collective — INCREASE TO MAINTAIN 60 PERCENT TRQ FOR AT LEAST 30 SECONDS.
7. Record OAT, PA, and TGT.
8. PCL (Engine not being checked) — FLY (as required).
9. Repeat steps 5. to 8. for opposite engine.
10. Determine table TGT from HIT TGT Reference Figure 7-2 for recorded OAT and PA.

Note

- When using HIT TGT Reference table, round up temperature to the nearest value.
- Ensure HIT checks are calculated and recorded using the appropriate HIT power check log (ground or flight).
- During operational checks, HIT TGT margin should be within upper and lower limits or a VIDS/MAF shall be initiated.

FAT °C	PRESSURE ALTITUDE-FT -1000	-500	0	500	1000	1500
55	736	740	744	748	753	758
53	730	734	738	742	747	751
51	724	728	732	736	740	745
49	718	721	725	729	734	738
47	712	715	719	723	727	732
45	706	709	713	717	721	725
43	701	703	707	711	715	719
41	695	698	702	706	710	713
39	690	692	696	700	704	707
37	684	687	690	694	698	702
35	679	681	685	689	692	696
33	673	676	679	683	687	690
31	668	670	674	677	681	685
29	662	665	668	671	675	679
27	657	659	662	666	670	673
25	651	654	657	660	664	667
23	645	648	651	655	658	662
21	639	642	645	649	652	656
19	634	636	640	643	647	650
17	628	631	634	638	641	644
15	623	625	629	632	635	638
13	617	620	623	626	630	633
11	612	614	618	621	624	627
9	606	609	612	616	619	622
7	600	603	607	610	613	616
5	595	598	601	605	608	611
3	589	592	595	599	602	605
1	584	586	590	593	597	600
–1	577	579	583	586	590	593
–3	571	574	577	581	584	587
–5	566	568	572	575	578	581
–7	560	563	566	569	573	576
–9	554	557	560	564	567	570
–11	549	552	555	558	561	564
–13	543	546	549	553	556	559
–15	538	540	544	547	550	553
–17	532	535	538	541	544	547
–19	526	529	532	536	539	542
–21	521	523	527	530	533	536
–23	515	518	521	524	527	530
–25	510	512	515	519	522	524
–27	504	507	510	513	516	519
–29	498	501	504	507	510	513
–31	492	495	498	501	504	507
–33	487	490	493	496	499	501
–35	482	484	487	490	493	496
–37	476	478	481	484	487	490
–39	470	473	476	479	482	484
–45	453	456	459	462	465	467
–50	439	441	444	447	450	453
–55	425	427	430	433	436	438

FAT °C	PRESSURE ALTITUDE-FT 2000	2500	3000	3500	4000	4500
55	763	769	775	781	787	792
53	757	762	768	774	780	785
51	750	756	761	767	773	779
49	744	749	755	761	767	772
47	737	743	748	754	760	766
45	731	736	741	747	753	759
43	725	729	734	740	746	752
41	718	723	728	733	739	745
39	712	716	721	726	732	738
37	706	710	714	720	725	731
35	700	704	709	713	719	724
33	694	698	703	707	712	717
31	689	692	697	702	707	711
29	683	687	691	696	701	705
27	677	681	685	690	695	700
25	671	675	680	684	689	694
23	666	669	674	678	683	688
21	660	664	668	672	677	682
19	654	658	662	667	671	676
17	648	652	656	661	665	670
15	642	646	650	655	659	664
13	636	640	644	649	654	658
11	631	634	638	643	647	652
9	625	629	633	637	641	646
7	620	623	627	631	635	640
5	614	618	621	625	630	634
3	609	612	616	620	624	628
1	603	607	610	614	618	622
–1	596	600	603	607	611	615
–3	591	594	598	602	606	609
–5	585	589	592	596	600	604
–7	579	583	587	590	594	598
–9	574	577	581	585	589	592
–11	568	571	575	579	583	586
–13	562	566	569	573	577	581
–15	556	560	564	567	571	575
–17	551	555	558	562	565	569
–19	545	549	552	556	559	563
–21	539	543	546	550	554	557
–23	534	537	540	544	548	551
–25	528	531	535	538	542	545
–27	522	526	529	532	536	539
–29	516	520	523	526	530	534
–31	511	514	517	521	524	528
–33	505	508	511	515	518	522
–35	499	502	506	509	512	516
–37	493	497	500	503	506	510
–39	487	491	494	497	500	504
–45	470	473	476	479	483	486
–50	456	459	462	465	468	471
–55	441	444	447	450	454	457

FAT °C	PRESSURE ALTITUDE-FT 5000	5500	6000	7000	8000	9000	10000
55	796	801	805	814	825	835	846
53	790	796	800	809	819	830	840
51	785	791	795	804	814	825	835
49	778	785	789	799	808	819	829
47	771	778	782	794	803	814	824
45	764	771	776	788	798	808	818
43	757	764	769	781	792	803	813
41	751	757	762	775	786	797	807
39	744	750	755	768	780	792	802
37	737	743	748	761	773	787	796
35	730	736	741	754	766	779	791
33	723	729	735	746	759	772	786
31	716	722	727	739	752	765	779
29	710	715	720	732	745	758	771
27	704	709	714	725	737	750	764
25	698	703	707	718	730	743	756
23	692	697	701	711	723	736	749
21	686	691	695	705	715	728	742
19	680	685	689	699	709	721	734
17	674	679	683	693	703	714	727
15	668	673	677	686	697	708	719
13	662	666	671	680	690	701	712
11	656	660	665	674	684	695	706
9	650	654	659	668	678	689	699
7	644	648	652	662	671	682	693
5	637	642	646	656	665	676	687
3	631	636	640	649	659	669	680
1	626	629	634	643	653	663	674
–1	618	622	626	635	645	655	666
–3	613	617	620	629	639	649	659
–5	607	611	615	623	632	642	652
–7	601	605	609	617	626	636	646
–9	596	599	603	611	620	630	639
–11	590	594	597	606	614	623	633
–13	584	588	591	600	608	617	627
–15	578	582	586	594	602	611	620
–17	572	576	580	588	596	605	614
–19	566	570	574	582	591	599	608
–21	560	564	568	577	585	593	602
–23	555	558	562	571	579	587	596
–25	549	552	556	565	573	581	589
–27	543	547	550	559	567	575	583
–29	537	541	545	553	561	569	577
–31	531	535	539	547	554	563	571
–33	525	529	533	541	548	556	565
–35	519	523	527	535	542	550	558
–37	513	517	521	529	536	544	552
–39	507	511	515	523	530	538	546
–45	489	493	497	505	512	519	527
–50	475	478	482	490	497	504	512
–55	460	464	467	475	481	489	496

Figure 7-2. HIT TGT Reference

7.17.2 Automatic Approach Checklist

WARNING

Aircrews of helicopters equipped with ALE-39 launchers shall ensure the ARM/SAFE switch on the arming control panel is in the SAFE position prior to commencing rescue approach.

Note

Approaches to or hovers in the vicinity of a Mk 25/58 MLM may cause the AN/AAR-47 to sense a threat and command the AN/ALE-39 to fire.

1. MAD — STOWED.
2. APS-124 — STBY (as required).
3. Rig for Rescue Checklist — AS REQUIRED.
4. PITOT HEAT — ON.
5. ALE-39 arming control panel — SAFE (as required).
6. RDR ALT pushbutton — ON.
7. RAD ALT/BAR ALT — MATCHED.
8. Radar altimeter — SET DH.
9. AFCS CONTROL panel:
   a. HVR ALT rotary knob — SET.
   b. LAT/LONG VEL rotary knobs — SET.
10. CONTGCY PWR switch — ON.
11. BACKUP HYD PMP — AS REQUIRED.
12. Mode select panel — DPLR/HVR.
13. DOP flag — CHECK.
14. Wind direction and velocity — NOTE.
15. TGT/torque — CHECK IN A HOVER.

7.17.3 Alert Launch Checklist

When the helicopter is to be placed in an alert condition, or started embarked or ashore with external power, the following checklist should be used in place of the normal Start, Systems Check, Starting Engines, Rotor Engagement, Pretaxi, and Taxi checklists:

1. Seats, belts, pedals, and mirrors — ADJUSTED.
2. Cockpit window emergency releases — AFT AND SHEARWIRED.
3. Left collective — EXTENDED AND LOCKED.
4. Circuit breakers and switches — CHECKED AND OFF.

Switches not having an OFF position should be checked as follows:

a. RDR, DATA LINK — STBY.
b. ATO ICS — NORM.
c. DATA LINK MODE — AUTO.
d. G REC — ON.
e. COMM CONTR mode select — T/R.
f. GUST LOCK — NORM.
g. TAIL SERVO — NORM.
h. Pilot ICS — NORM.
i. CARGO HOOK ARMING — SAFE.
j. CARGO HOOK EMER RLSE — OPEN.
k. FIRE DET TEST — OPER.
l. DE-ICE MASTER — MANUAL.
m. MODE 4 AUDIO/LIGHT/OUT — AUDIO.
n. Transponder ANT — DIV.

5. Parking brake — RESET.
6. TAIL WHEEL — LOCK.
7. Aircrewman Prestart checklist — COMPLETE.
8. Exterior/Interior/NVD lights — AS REQUIRED.
9. ENG T-handles — FORWARD, APU T-handle — IN.
10. ROTOR BRAKE — ON.
11. BATT — ON.

†12. UHF backup — SET.

13. Fire detector system — TEST.
14. EXT PWR — ON.
15. ICS — CHECK.

†16. Blade/pylon spread — AS REQUIRED.

CAUTION

- Should the blade fold system stall during spread, cycling the BLADE FOLD switch to FOLD should return the rotor blades to the folded position.
- Shut down the APU immediately if a rotor blade remains stalled in the APU exhaust.
- When the ROTOR SPREAD light is not illuminated, pressing the AFCS CONTROL panel RDR ALT pushbutton during blade fold system operations may cause failure of the system. Press this pushbutton only if flashing and after the blade spread evolution has been completed.

a. Area — CLEAR (wing walkers positioned as required).
b. CMPTR PWR/RESET pushbutton — ON.
c. BLADE FOLD MASTER switch — ON.
d. BLADE FOLD switch — SPREAD.
e. PYLON FLIGHT and ROTOR SPREAD lights — ILLUMINATED.

WARNING

Illumination of the ROTOR SPREAD light may not be an accurate indication of the blades being properly spread. Rotor engagement with improperly spread blades may result in catastrophic rotor failure. A head check shall be conducted any time the BLADE FOLD switch is moved from the OFF position.

f. RDR ALT pushbutton — PRESS (if flashing).

Note

If RDR ALT pushbutton is flashing, pressing will update flight control position to AFCS.

g. BLADE FOLD switch — OFF.
h. BLADE FOLD MASTER switch — OFF.
i. Head check — PERFORM.

17. Lockpin status — CHECK.
    a. BLADE FOLD MASTER — ON.
    b. STATUS PYLON FLIGHT light — ON.

WARNING

If STATUS PYLON FLIGHT light is not illuminated, pylon and stabilator lockpins and the tail rotor index actuator shall be visually checked prior to flight.

    c. STATUS ROTOR SPREAD light — ON.

If ROTOR SPREAD light not ON:

    d. CMPTR PWR/RESET — OFF.
    e. BACKUP HYD PMP — OFF.
    f. BLADE FOLD — SPREAD.

WARNING

Blade lockpins may indicate engaged with blades not fully spread. If the BLADE FOLD switch is placed in the spread position, a visual check shall be performed prior to rotor engagement to ensure all rotor blade lockpins are engaged and all pitchlock pins are retracted.

CAUTION

If uncommanded blade fold occurs when BLADE FOLD switch is placed to SPREAD, the BLADE FOLD MASTER switch should be placed to the OFF position. Do not secure electrical or hydraulic power until blades are respread using BLADE FOLD test set.

Note

If a documented discrepancy exists in the blade lockpin/microswitch indicating system, the BLADE FOLD switch may be left in the OFF position if the blade lockpins were visually checked on preflight.

If ROTOR SPREAD light on:

g. BLADE FOLD — OFF.

h. BLADE FOLD MASTER — OFF.

18. CMPTR PWR/RESET — CYCLE/ON.
19. SAS/BOOST — ON.
20. BACKUP HYD PMP — ON.
21. MSN PWR — PRI.
22. DPLR, RDR, DATA LINK — RADIATE.

Note

With data link hardwire installed, difficulty may be experienced in loading SAC-1 or SAC-2 if the ship is trying to uplink data. To alleviate this problem, place the DATA LINK switch to STBY until SAC-1 and SAC-2 have completed their load.

23. SO — IPL.
24. Initialize FHS — AS REQUIRED.

WARNING

When the FLIR PWR switch is ON, the FLIR turret automatically moves to the STOW position. Ensure personnel and equipment are clear of the FLIR turret area before applying power.

a. FLIR PWR — ON.

b. HELLFIRE PWR — ON.

25. ATO MPD — ON.
26. Secure equipment — KEY.
27. INIT NAV.

If GPS is to be used as the primary navigation mode:

a. GPS — KEY.

b. GPS — INIT/TEST (via equipment status table once GPS is available).

28. RAD ALT, BAR ALT, clocks — SET.
29. Secure communications — CHECK.
30. DIGITS — ON; CDU and PDU — TEST.
31. Fuel quantity and readout — Check (maximum differential of 200 pounds).
32. Caution, advisory, warning lights — CHECK.
33. TACAN/IFF — REC, STBY.

†34. Primary servos/pitch lockpin — CHECK.

†35. Boost servos — CHECK.

†36. Tail rotor servo — CHECK.

†37. AFCS — Check.

†38. STABILATOR — CHECK.

WARNING

Helicopter shall not be flown if any part of stabilator check fails.

†39. Rescue Hoist Preoperational Check — AS REQUIRED.

†40. Cargo Hook Preoperational Check — AS REQUIRED.

If required, the aircraft may be secured indefinitely at this point by performing the following:

1. BACKUP HYD PMP — OFF.
2. SAC POWER — OFF.
3. FLIR PWR — OFF.
4. HELLFIRE PWR — OFF.
5. MSN PWR — OFF.
6. EXT PWR — OFF.
7. BATT — OFF.

Note

If mission power is secured for more than 2 minutes, the KG-45 will require rekeying after mission power is reenergized.

When ready to launch, perform the following:

1. BATT — ON.
2. EXT PWR — ON.
3. BACKUP HYD PMP — ON.
4. SAS-1, SAS-2, TRIM, AUTO PLT — ON.
5. MSN PWR — PRI/SEC (as required).
6. FLIR PWR — ON.
7. KG-45 — KEY.
8. INIT NAV.

7.17.3.1 Starting APU and Engines

1. High Points and Tail Tiedowns — VERIFY REMOVED.
2. Fireguard posted, area clear.
3. ECS — OFF.
4. Lights — AS REQUIRED.
5. AIR SOURCE ECS/START — APU.
6. FUEL PUMP — APU BOOST.
7. APU CONTROL — ON.

Note

When mission avionics COMSEC gear is loaded with external power, the use of the APU generator may zeroize the codes.

8. Doors, inertia reels — LOCKED.
9. ECS — AS DESIRED.
10. ROTOR BRAKE — 450 psi minimum.
11. ENGINE IGNITION — NORM.
12. Fuel selectors — XFD.
13. Engines — START.
14. Engine oil pressure — CHECK.
15. Starter lights — OUT.
16. ENGINE IDLE Ng — CHECK, 63 percent or greater and matched within 3 percent.

7.17.3.2 Engagement

1. Area — CLEAR.
2. Flight controls — POSITION (as required).
   a. Cyclic/pedals — CENTERED.
   b. Collective — DOWN AND HOLD.
3. Lights — AS REQUIRED.

Note

Operation other than transient in the 20 percent to 40 percent and 60 percent to 75 percent Np range shall be avoided.

4. Rotor — ENGAGE.
   a. Rotor brake/advisory light — OUT.
   b. ENG POWER CONT levers — Smoothly advance to FLY.
   c. #1 and #2 HYD PUMP caution lights — OUT.
   d. Droop stops — OUT.

Note

If all droop stops are not out by 100 percent Nr, shut down and investigate.

   e. Transmission oil pressure — CHECK.
5. ENG POWER CONT levers — FLY.
6. Fuel selectors — DIR.
7. BACKUP HYD PMP — AUTO.
8. Torques — Matched within 5 percent.
9. Engines — 100 percent Np/Nr.
10. SAC POWER — OFF.
11. NO. 1 and NO. 2 GENERATORS — ON.
12. APU GENERATOR — ON.
13. External power — OFF.
14. Engine overspeed system and autoignition — CHECK.
15. Hydraulic leak system — CHECK.
16. Backup tail rotor servo — CHECK.
    a. BACKUP HYD PMP — OFF, then AUTO.
    b. TAIL SERVO — BKUP.
    c. TAIL SERVO — NORM.
17. SAC POWER — ON.
18. ALQ-205 — AS REQUIRED.
19. AAR-47 — ON (2-minute warmup).
20. Mode select panel, BDHIs and AIs — CHECK.
21. TACAN/IFF — TEST, set.
22. BLADE DE-ICE — AS REQUIRED.
23. ENG ANTI-ICE, PITOT HEAT, DE-ICE MASTER — AS REQUIRED.
24. RAD ALT — TEST.
25. External power and data link hardwire — DISCONNECT.
26. HELLFIRE PWR — OFF.
27. ALE-39 arming handles — AS REQUIRED.

WARNING

- Inadvertent launch of chaff/flares may occur from the ALE-39 when the external arming handles are in the ARM position regardless of the position of the SAFE/ARM switch on the arming control panel.
- Ensure AAR-47 2-minute warmup period and BIT checks have concluded before arming the ALE-39 arming handles.

Continue with the normal Takeoff Checklist.

7.17.4 Fuel Dump Checklist

WARNING

- Fuel dumping should be manually terminated at no less than 600 pounds total fuel. With less than 600 pounds of fuel, fuel starvation may occur when balanced flight is not maintained and/or pitch attitudes exceed 15° nose up or nose down.
- Internal wear of the fuel dump switch guard may not move the switch to the OFF position. Aircrew must verify switch position when completing dumping procedures.

1. Determine the amount of fuel to be dumped.
2. BuNo 162349 and subsequent, FUEL MGMT panel — TRANSFER/MANUAL OVRD.
3. ALE-39 power — OFF.
4. FUEL DUMP switch — DUMP.
5. FMCP — FUEL DUMP light — Illuminated (as applicable).

After the desired quantity has been dumped:

6. FUEL DUMP switch — OFF.
7. Observe the fuel readout to ensure that dumping has ceased.

If fuel dumping continues:

8. FUEL DUMP circuit breakers — PULL.
   a. FUEL DUMP NO. 1 (CENTER, NO. 1 AC PRI, ROW 1, CB 13).
   b. FUEL DUMP PUMP (CORNER, NO. 2 AC PRI, ROW 1, CB 1).
   c. FUEL DUMP CONTR (ATO OVHD, DC ESSNTL, ROW 3, CB 1).
9. FUEL DUMP switch — CYCLE.
10. **Land as soon as practical**.

7.17.5 Engine Fuel System Priming Checklist

Note

Helicopter prime/boost pump capacity is not sufficient to prime an engine when the Opposite engine is running. Therefore, engines should be primed individually with both engines OFF.

1. Fuel selector — DIR.
2. PCL — Hold in LOCKOUT.
3. FUEL PUMP switch — FUEL PRIME. Hold until plane captain reports steady flow of fuel coming from overboard drain.
4. Repeat steps 2. and 3. with fuel selector in XFD.
5. FUEL PUMP switch — APU BOOST.
6. PCL — OFF.

7.17.6 Rig for Rescue Checklist

WARNING

Radiation hazard exists to rescue swimmer and survivor from the APS-124 radar. Ensure RADAR is set to STBY prior to swimmer deployment and/or hoisting.

Note

Crewman shall utilize approved hoisting glove(s) during hoisting evolutions.

1. SAC POWER — OFF.
2. BACKUP HYD PMP — ON.
3. SAC POWER — ON.
4. Report — “UNSTRAPPING”.
5. Safety Belt — DON.
6. Rescue station ICS — ADJUST (as required).
7. Cabin area — PREPARE.
8. RAST MASTER, CARGO HOOK CONTROL, Magnetic Detecting Set — OFF, SAFE.
9. Cabin door — OPEN (at or below 60 knots).
10. RESCUE HOIST control — ALL.
11. Rescue hoist NORMAL POWER light — VERIFY ON.
12. Rescue hoist check — VERIFY, if required.

WARNING

Personnel hoisting shall not be attempted with a damaged cable.

13. Report — “RIGGED FOR RESCUE”.

7.17.7 Litter Platform Setup Procedures

1. Break down the instructor seat and stow forward.
2. Slide the SO seat down and full forward.

3. Break out and unfold the platform, the end with the leg extension toward the cabin door.
4. Center the platform between the launcher and SO seat. Squarely position and hook the feet end over the left SO seat track. Lower the platform so that the two edge tabs slide over the outboard edge of the right seat track and extend the support leg.
5. Slide the litter all the way in against the left bulkhead.
6. Secure the litter/platform with the two straps that you have anchored to the cabin floor at the four attachment points.

Note

Helicopters modified with the ALE-39 chaff and flare dispenser will no longer accommodate the rescue/Stokes litter and allow for cabin door closure. Modified helicopters should use a SAR MEDEVAC litter for patient/crewman safety and comfort. When closing the cabin door with the SAR MEDEVAC litter in the cabin and ALE-39 installed, it may be necessary to slightly lift the head of the litter to allow the cabin door to pass.

7.17.8 VERTREP Operations Checklist

1. Landing Checklist — COMPLETE.
2. Crewman — RIG FOR CARGO OPERATIONS.
3. MAD reeling machine, RAST panel, and RESCUE HOIST POWER — OFF.
4. Cargo Hook Preoperational Checklist — COMPLETE.
5. CARGO HOOK CONTR — ARMED/ALL.
6. CARGO HOOK EMERG REL — NORM.
7. Radar Altimeter — SET DH.

After external cargo operations:

8. CARGO HOOK CONTR — SAFE.
9. CARGO HOOK EMERG REL switch — OPEN.
10. Cargo Hook — STOW, SECURE ACCESS PANEL.

7.17.9 Blade De-Ice System Check

Note

A TR DE-ICE FAIL caution may appear during the blade de-ice test while in an electromagnetic environment.

1. BLADE DE-ICE TEST selector switch — NORM.
2. BLADE DE-ICE POWER switch — TEST.

CAUTION

Leaving the BLADE DE-ICE POWER switch in the TEST position may cause blade damage.

3. PWR MAIN RTR and TAIL RTR lights — CHECK. PWR MAIN RTR light may illuminate for 2 to 4 seconds.

CAUTION

If PWR MAIN RTR or TAIL RTR lights remain on for more than 10 seconds, main rotor or tail rotor damage may result. Turn BLADE DE-ICE POWER switch OFF. If either light remains illuminated, pull the appropriate circuit breaker. If either light remains illuminated, secure electrical power.

4. TEST IN PROGRESS light — CHECK. The light should illuminate for 2 minutes. The ICE DETECTED caution will appear for approximately 6 seconds. No other blade de-ice system cautions should appear. PWR MAIN RTR and TAIL RTR lights should illuminate for 2 to 4 seconds near end of test. The TEST IN PROGRESS light should then extinguish.
5. BLADE DE-ICE POWER switch — OFF.
6. BLADE DE-ICE TEST selector switch — SYNC 1.
7. BLADE DE-ICE POWER switch — TEST. MR DE-ICE FAIL caution appears.
8. BLADE DE-ICE POWER switch — OFF. MR DE-ICE FAIL caution disappears.
9. BLADE DE-ICE TEST selector switch — SYNC 2.
10. BLADE DE-ICE POWER switch — TEST. MR DE-ICE FAIL caution appears.
11. BLADE DE-ICE POWER switch — OFF. MR DE-ICE FAIL caution disappears.
12. BLADE DE-ICE TEST selector switch — OAT.
13. BLADE DE-ICE POWER switch — TEST. MR DE-ICE FAIL and TR DE-ICE FAIL cautions appear.
14. BLADE DE-ICE POWER switch — OFF. MR DE-ICE FAIL and TR DE-ICE FAIL cautions disappear.

CAUTION

EOT test should not be performed at ambient temperatures above 38 °C. Between 22 °C and 38 °C, allow 5 minutes at 100 percent N_r before this test is attempted. Between 10 °C and 22 °C, rotor must be turning at 100 percent. Exceeding temperature parameters may cause blade damage.

15. BLADE DE-ICE TEST selector switch — EOT.
16. BLADE DE-ICE MODE selector switch — MANUAL (M).
17. BLADE DE-ICE POWER switch — ON. TR DE-ICE FAIL caution appears after approximately 15 to 30 seconds. MR DE-ICE FAIL caution appears after approximately 50 to 70 seconds. PWR MAIN RTR and/or PWR TAIL RTR lights may flash.
18. BLADE DE-ICE POWER switch — OFF. TR DE-ICE FAIL and MR DE-ICE FAIL cautions disappear.
19. BLADE DE-ICE TEST selector switch — NORM.
20. BLADE DE-ICE POWER switch — OFF.
21. BLADE DE-ICE MODE selector switch — AUTO.
22. APU GENERATOR backup — CHECK.
    a. NO. 1 or NO. 2 generator — OFF. Applicable GEN caution light should be on.
    b. BLADE DE-ICE MODE SELECT — MANUAL (M).

c. APU GENERATOR — ON.

d. BLADE DE-ICE POWER — ON. Wait 30 seconds, no de-ice lights should be on.

e. Generator turned off in step a. — ON. (Applicable GEN caution light should go off.)

f. BLADE DE-ICE POWER — OFF.

g. BLADE DE-ICE MODE — AUTO.

7.17.10 Engine Anti-Ice Check

1. PCL (engine not being checked) — AS REQUIRED.

WARNING

Failure of the ENG ANTI-ICE ON advisory to illuminate when the ENG ANTI-ICE switch is selected to ON, or when the N_g is below approximately 88 percent regardless of the switch position; or constant illumination of the ENG ANTI-ICE ON advisory with N_g greater than 90 percent (94 percent if OAT is 15 °C or greater) and the ENG ANTI-ICE switch OFF are indicative of a malfunctioning anti-ice/start bleed valve. This condition may cause engine flameout during low power settings such as quick stops and autorotative flight.

Note

- Engine Anti-ice Check should be performed into the wind on deck, in a hover over a suitable landing pad, or in a stable, level-flight regime.
- On deck or in a hover, it may be necessary to retard the PCL on the engine not being checked to prevent a vertical climb.

2. ENG ANTI-ICE switch (engine being checked) — OFF.
3. Collective — Raise to increase N_g of engine being checked to 90 percent or above (94 percent if OAT is above 15 °C).
4. ENG ANTI-ICE ON advisory (engine being checked) — Does not appear.
5. ENG ANTI-ICE switch (engine being checked) — ON.

Confirm:

a. ECS SHUTDOWN caution (if ECS on and AIR SOURCE ECS/START switch — ENG).

b. TGT increases 30° to 100 °C.

c. ENG ANTI-ICE ON advisory appears.

d. ENG INLET ANTI-ICE ON advisory:

(1) OAT above 13 °C — DOES NOT APPEAR.

(2) OAT above 4° up to 13 °C — MAY APPEAR.

(3) OAT 4 °C and below — APPEARS.

WARNING

A TGT increase greater than 100 °C and/or appearance of either ENG INLET ANTI-ICE ON advisory when OAT is above 13 °C may result in a loss in available torque at intermediate power up to 49 percent when the engine anti-ice system is activated. If any part of the engine anti-ice check fails, maintenance action is required prior to flight into icing conditions.

6. ENG ANTI-ICE switch (engine being checked) — OFF.

Confirm:

a. TGT decreases.

b. ENG ANTI-ICE ON advisory — DISAPPEARS.

c. ECS — ON (if ECS on and AIR SOURCE ECS/START switch — ENG).

d. ENG INLET ANTI-ICE ON advisory — DISAPPEARS (after approximately 90 seconds).

7. PCL (engine not being checked) — FLY.
8. Repeat steps 1. to 7. for other engine.

7.17.11 Accelerometer Null Procedures

Accelerometers are normally nulled during AFCS maintenance ashore. Ship motions and accelerations will often prevent the completion of a successful accelerometer null operation while deployed. The following procedure will allow the flight crew to perform the accelerometer null operation in flight when an on-deck null cannot be successfully accomplished.

1. CMPTR PWR/RESET pushbutton — CYCLE.
2. SAS 1, SAS 2, TRIM and AUTO PLT pushbuttons — ON.
3. Wait at least 2 minutes.
4. Fly at 100 KIAS in straight and level, unaccelerated flight.
5. ACCEL NULL switch — NULL FOR 0.5 TO 2.0 SECONDS.

Note

Null will fail if ACCEL NULL switch is held for more than two seconds.

6. If the null is accepted TRIM and AUTO PLT pushbuttons will extinguish approximately 2 seconds after ACCEL NULL switch is released.
7. Repeat steps 1. through 6. until a null is accepted.

7.17.12 Engine Cleaning Procedures

Note

The following engine cleaning procedures are to be performed when engine cleaning is performed independent of the SHUTDOWN checklist. For engine cleaning during the SHUTDOWN checklist, proceed to step 14.

1. Water wash connector — CONNECTED.
2. Circuit breakers and switches — CHECKED and OFF.

3. Rotor brake — ON.

WARNING

Do not release rotor brake if blades are folded unless secured in place by blade crutches/clamps. Releasing the rotor brake with unsecured folded blades may result in damage to aircraft, injury to nearby personnel, and/or all four blades rotating together, which may result in aircraft rollover.

4. BATT — ON.
5. Fire detector system — TEST.
6. Fire guard — POSTED, AREA CLEAR.
7. Interior/Exterior /NVD lighting — AS REQUIRED.
8. APU — START.
   a. ECS — OFF.
   b. AIR SOURCE ECS/START — APU.
   c. FUEL PUMP — APU BOOST.
   d. APU CONTROL — ON.
9. APU GENERATOR — ON.
10. ECS — AS REQUIRED.
11. Blade/pylon spread — AS REQUIRED (refer to Prestart Checks).
12. Lockpins status — CHECK.
13. BACKUP HYD PMP — ON.
14. ENGINE IGNITION — OFF.

CAUTION

- Engine must be allowed to cool to a TGT of 80 °C or below, by motoring engine starter (if necessary), before water or cleaning solution is sprayed into engine.
- Engine PCL and ignition switch must be off while motoring engine.
- Do not exceed starter limits (Refer to Chapter 4, Operating Limits).
- If N_g decreases below 16 percent during engine cleaning, secure starter to prevent engine damage.

Note

The T-700-GE-401C Performance Recovery Wash (60 hour) requires both Compressor and Hot Section cleaning. Hot Section cleaning is required following operation in sandy, dusty, and dirty environments. Hot Section cleaning entails removing engine igniter plugs and injecting cleaning solution through the igniter ports. Compressor cleaning entails injecting cleaning solution through the water wash connector.

15. Hot Section cleaning procedure — AS REQUIRED.

WARNING

To prevent electrical shock to maintenance personnel, ensure ENGINE IGNITION switch is in the OFF position and both NO. 1 and NO. 2 engine overspeed circuit breakers are pulled (open) during engine cleaning.

a. NO. 1 and NO. 2 ENG OVSP circuit breakers — PULL.

b. NO. 2 engine starter — ENGAGE. Motor to maximum starter speed.

c. TGT below 80 °C, dispense cleaner for 60 seconds.

d. NO. 2 engine starter — DISENGAGE.

e. Repeat steps b. through d. for NO. 1 engine.

If performing Hot Section cleaning only:

f. Allow cleaner to soak for 10 minutes and then proceed to Water Wash Procedures (step 17.).

If performing Performance Recovery Wash:

g. Proceed to Compressor cleaning (step 16.).

16. Compressor cleaning — AS REQUIRED.

a. NO. 2 engine starter — ENGAGE. Motor to maximum starter speed.

b. When TGT below 80 °C, dispense cleaner for 60 seconds.

c. NO. 2 engine starter — DISENGAGE.

d. Repeat steps a. through c. for NO. 1 engine.

e. Allow cleaner to soak for 10 minutes.

17. Water Wash procedure — PERFORM.

a. NO. 2 engine starter — ENGAGE. Motor to maximum starter speed.

b. When TGT below 80 °C, rinse engine for 60 seconds (90 seconds if cleaner used, observing starter duty cycle, until clean water is observed coming out of engine exhaust).

c. NO. 2 engine starter — DISENGAGE.

d. Repeat steps a. through c. for NO. 1 engine.

CAUTION

Engine dry-out cycle will be performed with the rotor brake ON. The PCLs should not be advanced above IDLE during engine dry-out. If ashore and rotor engagement is required following engine dry-out cycle, the engines should be shut down from IDLE and restarted with the rotor brake off.

Engine Dry-out:

18. Water Wash connector — REMOVE.

19. NO. 1 and NO. 2 ENG OVSP circuit breakers — RESET (as required).

20. Fireguard — POSTED, AREA CLEAR.
21. Doors, inertia reels — LOCKED.
22. SAS 1, SAS 2, TRIM, and AUTO PLT — ON.
23. Rotor brake — CHECK PRESSURE 450 PSI MINIMUM.
24. ENGINE IGNITION — NORM.
25. Fuel selectors — XFD.

CAUTION

Start the NO. 2 engine first to preclude exceeding NO. 1 engine starter limitations.

26. Lights — AS REQUIRED.
27. Engines — START.
    a. Starter — ENGAGE AT MAXIMUM STARTER SPEED FOR 30 SECONDS.
    b. PCL — IDLE.
28. Engine oil pressures — CHECK.
29. ENG STARTER advisories — OUT.
30. Engines — RUN AT IDLE FOR 6 MINUTES.

After 5 minutes:

a. ENG ANTI-ICE — OFF.
b. AIR SOURCE ECS/START — ENG.
c. ECS — OFF.

Note

Leaving ECS ON may lead to APU failure.

After 1 minute:

d. ENGINE IGNITION — OFF.

31. PCLs and fuel selectors — OFF.
32. TGT — MONITOR.
33. Blade fold — AS REQUIRED (refer to Shutdown Checks).
34. BACKUP HYD PMP — OFF.
35. STABILATOR MAN SLEW — SLEW to 0° (as required).
36. ECS — OFF.
37. Interior/Exterior/NVD lighting — OFF.
38. APU GENERATOR — OFF.
39. APU — SHUTDOWN.
    a. AIR SOURCE ECS/START — OFF.
    b. APU CONTR — OFF.
    c. FUEL PUMP — OFF.

40. BATT — OFF.
41. Utility Lights — OFF.

7.17.13 Sonobuoy Launching

7.17.13.1 Automatic Sonobuoy Launching

1. System circuit breakers — IN.
2. Sonobuoy ECU — Verify AU displayed.
3. WEAPONS SELECT (AN/ASQ-198) — AS REQUIRED.
4. MASTER ARM — ARM.

Note

- When using the AN/ASQ-165, sonobuoys may be launched with TORPEDO SELECT in any position except OFF.
- When using the AN/ASQ-198, sonobuoys may be launched with WEAPONS SELECT in any position.

5. TORPEDO SELECT (AN/ASQ-165) — AS REQUIRED.

CAUTION

- When using the AN/ASQ-165, failing to SELECT SAFE with the TORPEDO SELECT switch may lead to unintended weapon or auxiliary tank launch.
- When using the AN/ASQ-198, failing to select SONO ONLY with the WEAPONS SELECT switch may lead to unintended weapon or auxiliary tank launch.

6. SONO SELECT MODE — AUTO.
7. SONO LAUNCH MODE — AUTO.
8. Observe RDY INDICATION on SONO LAUNCH button.

Note

- Sonobuoy will be launched automatically when the fly-to-point (FTP) is captured.
- A successful launch will be indicated by the SONO LAUNCH button indicating AWAY for approximately 3 seconds. SONO LAUNCH RDY will illuminate again if an additional FTP is active.

7.17.13.2 Manual Sonobuoy Launching

1. System circuit breakers — IN.
2. Sonobuoy ECU — Verify AU displayed.

3. WEAPONS SELECT (AN/ASQ-198) — AS REQUIRED.
4. MASTER ARM — ARM.

Note

- When using the AN/ASQ-165, sonobuoys may be launched with TORPEDO select in any position except OFF.
- When using the AN/ASQ-198, sonobuoys may be launched with WEAPONS select in any position.

5. TORPEDO SELECT (AN/ASQ-165) — AS REQUIRED.

CAUTION

- When using the AN/ASQ-165, failing to SELECT SAFE with the TORPEDO SELECT switch may lead to unintended weapon or auxiliary tank launch.
- When using the AN/ASQ-198, failing to select SONO ONLY with the WEAPONS SELECT switch may lead to unintended weapon or auxiliary tank launch.

6. SONO SELECT MODE — MAN.
7. SONO LAUNCH MODE — MAN.
8. TUBE SELECT — AS REQUIRED.
9. Observe READY or RDY INDICATION on SONO LAUNCH button.
10. Press SONO LAUNCH button to launch selected sonobuoy.

Note

A successful launch will be indicated by the SONO LAUNCH button going to AWAY.

7.17.14 Torpedo Launching

7.17.14.1 Torpedo Launching (with AN/ASQ-165A) Except for Mk 46 MOD 5A (SW) SLEP Torpedo

Note

Refer to NTTP 3-22.5-ASW (ASW Tactical Pocket Guide) for torpedo launch envelope and tactical employment.

1. System circuit breakers — IN.
2. SRCH DPTH — SELECT.
3. MODE/CEIL — SELECT.
4. COURSE — SELECT.

CAUTION

Any subsequent changes to the thumbwheel selectors should be done by first returning MASTER ARM to SAFE. Verify MASTER ARM goes to SAFE before resetting thumbwheel selectors to prevent possible presetting malfunctions.

5. MASTER ARM — ARM.
6. TORPEDO SELECT — AS REQUIRED.

CAUTION

To prevent possible damage to the ASDC and improper torpedo presetting, allow at least a 10-second interval between depressions of the TORPEDO SELECT pushbutton.

7. TORPEDO ARMING — NS-TL.
8. STATUS READY light — CHECK ON.
9. READY INDICATION on TORPEDO LAUNCH — CHECK.
10. TORPEDO SELECT — AS REQUIRED.

CAUTION

To prevent possible damage to the ASDC and improper torpedo presetting, allow at least a 10-second interval between depressions of the TORPEDO SELECT pushbutton.

11. READY INDICATION on TORPEDO LAUNCH — CHECK.

Upon capture of weapon FTP:

12. TORPEDO LAUNCH — PRESS.

CAUTION

Subsequent actuation of the TORPEDO LAUNCH pushbutton after an attempted launch will enable a secondary launch release regardless of time between initial and subsequent actuation. This initiates a secondary launch sequence resulting in the CAD firing. The BRU-14A bomb rack will be damaged and require intermediate-level repair. Prevention of CAD firing can only be achieved by setting the MASTER ARM switch to the SAFE position prior to actuation of the TORPEDO LAUNCH pushbutton after an attempted launch.

13. AWAY INDICATION on TORPEDO LAUNCH — CHECK.

Note

A successful launch will be indicated by the TORPEDO LAUNCH going to AWAY for approximately 3 seconds. Visually confirm weapon is away.

14. TORPEDO SELECT — SAFE.
15. TORPEDO ARM — SAFE.
16. MASTER ARM — AS REQUIRED.

7.17.14.2 Torpedo Launching (with AN/ASQ-198) Except for Mk 46 MOD 5A (SW) SLEP Torpedo

CAUTION

Mk 54 MOD 0 torpedo can only be used with AN/ASQ-198 configured aircraft.

Note

- Refer to NTTP 3-22.5-ASW (ASW Tactical Pocket Guide) for torpedo launch envelope and tactical employment.
- Refer to Torpedo Programming Conversion Table (Figure 7-3) when setting SRCH DPTH, MODE/CEIL, and COURSE thumbwheel selector switches.
- Refer to NAWCD China Lake prepared preliminary checklists for the Mk 54 aircraft release and control, weapon inspection, and loading prior to any Mk 54 MOD 0 mission.

1. System circuit breakers — IN.
2. SRCH DPTH — SELECT.
3. MODE/CEIL — SELECT.
4. COURSE — SELECT.
5. Mk 50 heaters — ON or OFF (as required).
6. WEAPONS SELECT — PORT AFT, PORT FWD, or STBD AFT (as required).
7. MASTER ARM — ARM.
8. Observe IFOBRL status indicator — UL.

Note

The in-flight operable bomb rack lock (IFOBRL) status indicator will transition from LK (Lock) to UL (Unlock) within 5 seconds after pressing MASTER ARM if the bomb rack is functioning properly. Transition time greater than 5 seconds indicates a malfunctioning bomb rack.

SRCH DPTH SWITCH TRANSLATION				MODE/CEIL SWITCH TRANSLATION				COURSE SWITCH TRANSLATION			
SWITCH LABEL	Mk 46 PRO-GRAM	Mk 50 PRO-GRAM	Mk 54 PRO-GRAM	SWITCH LABEL	Mk 46 PRO-GRAM	Mk 50 PROGRAM	Mk 54 PROGRAM	SWITCH LABEL	Mk 46 PRO-GRAM	Mk 50 PRO-GRAM	Mk 54 PRO-GRAM
1	125	12	60/SWT	1	A20	20	STD PDA ON	70L	P70	70L	P70
2	80	55	125	2	A50	60	STD PDA OFF	35L	P35	35L	P35
3	275	375	N375	3	HATS	HATS	HATS	0	0	0	0
4	500	D375	D375	4	P20	ST20	PDT	35R	S35	35R	S35
5	850	850	700	5	P50	D60	BOTTOM	70R	S70	70R	S70
6	1400	1600	1600	6	SNKE	SVTT	—	95R	S95	95R	S95
—	—	—	—	—	—	—	—	120R	S120	120R	S120
—	—	—	—	—	—	—	—	150R	S150	150R	S150
—	—	—	—	—	—	—	—	180	180	180	180
—	—	—	—	—	—	—	—	150L	P150	150L	P150
—	—	—	—	—	—	—	—	120L	P120	120L	P120
—	—	—	—	—	—	—	—	95L	P95	95L	P95

Figure 7-3. AN/ASQ-198 ACI Panel Torpedo Programming Conversion Table

Note

If operating with an armament adapter installed, the IFOBRL status indicators will be inoperative; however, the bomb rack will function normally.

9. TORPEDO STATUS TORP READY light — ON.

CAUTION

Any subsequent changes to the thumbwheel selectors should be done by first returning MASTER ARM to SAFE. Verify MASTER ARM goes to SAFE before resetting thumbwheel selectors to prevent possible presetting malfunctions.

10. WEAPON LAUNCH RDY light — ON.

Upon capture of weapon FTP:

11. WEAPON LAUNCH — PRESS.

CAUTION

If WEAPON LAUNCH is pressed and the bomb rack is malfunctioning, a secondary launch release is automatically enabled. The secondary launch release initiates an emergency launch sequence resulting in CAD firing. The BRU-14A bomb rack will be damaged and require intermediate-level repair.