Chapter 2

TOWING AND TAXIING AIRCRAFT

2.1. Hazards and Human Factors . When properly accomplished, aircraft towing is not a hazardous operation. However, the potential for damage and (or) injury if a mishap occurs is high.

2.2. Towing Operations . Using qualified personnel, following established procedures and properly planning for weather, local conditions like inclined ramps, emergencies, and other limitations should prevent mishaps. AFI 21-101 will be consulted for vehicle operator's aircraft towing responsibilities and qualifications. For maximum safety, tow team personnel will not place themselves in the direct path of aircraft wheels nor ride on any external portion of an aircraft or tow vehicle. When connecting a tow bar to any tow vehicle, personnel will stand clear until the backing tow vehicle is in close proximity to the towbar. When connecting a tow vehicle, personnel will be extremely vigilant to any sudden movement by the two vehicles. MAJCOMs may authorize the movement of aircraft into hardened aircraft shelters (HAS) while the aircraft engines are operating, provided a System Safety Engineering Analysis (SSEA) has been conducted. This will be conducted for each type of generation shelter and for the type of aircraft that will be moved into shelter. **NOTE:** When differences exist in towing procedures prescribed in this standard and applicable technical data for the specific aircraft, the technical data will take precedence.

2.2.1. Qualified Personnel. Aircraft ground handling personnel will be thoroughly familiar with all published towing procedures pertaining to the type of aircraft being towed. Written proficiency tests on local procedures and operating standards review will be conducted at least annually. Newly assigned aircraft maintenance specialists will pass a proficiency test on the types of aircraft towed, after completing supervised on-the-job training (OJT). Wing and tail walkers may not be required to be familiar with all published towing procedures or receive annual proficiency training if their duties are restricted to these positions during tow operations. Supervisors of towing teams will clearly define duties and responsibilities at the time of the pre-tow briefing. (See paragraphs **2.2.3.2.**, **2.2.3.3.**, and **2.2.3.5.**)

2.2.2. Supervisor of Towing Team. The supervisor of the towing team will be in complete command and will take a position that will ensure surveillance of the towing procedures and performance of other team members. Normally this will be the position of nose walker. The supervisor will use a checklist covering all items pertaining to the safe movement of the type aircraft being handled. Applicable steps of this checklist will be completed and towing personnel will be briefed before the aircraft is moved. The supervisor will be the only team member authorized to give the "all clear to move" order and will ensure all team members are qualified per requirements in paragraph 2.2.1.

2.2.3. Towing Team Assignments. When towing aircraft, team personnel will be stationed to conform to applicable aircraft TO procedures for the type aircraft being towed. Specific number of individuals required on a tow team will conform to those called for in the applicable aircraft TO. In all cases there will be a towing team supervisor. **NOTE:** Tail and wing walkers are not required when towing aircraft on unobstructed, established taxiways and runways or parking ramps where taxi or towing lanes are marked with guide lines.

2.2.3.1. Brake Person in Cockpit. A qualified person, authorized by the supervisor, will be in the pilot's seat to operate the aircraft's brakes and to observe and follow the supervisor's signals. If

the person in the pilot's seat is unable to maintain hydraulic pressure, another qualified person will be stationed to watch and maintain the pressure. The supervisor will be notified if the pressure drops below safe operating limits, and the towing operation will be terminated.

2.2.3.2. Tow Vehicle Operator. The towing vehicle driver will be responsible for operating the vehicle in a safe manner and will follow the instructions issued by the team supervisor. The vehicle operator will also obey emergency stop instructions given by any team member. An authorized and qualified vehicle operator will be at the controls of the towing vehicle at all times during aircraft movement. The tow vehicle will be connected in a manner which will allow the vehicle driver to face the direction of travel while seated. Vehicle operators will not look over their shoulder to face the direction of travel except while making minor changes during final positioning (the towing supervisor must make this determination and brief the towing crew). The vehicle operator will stop the vehicle upon losing sight of or communication with the tow supervisor.

2.2.3.3. Wing Walker. A wing walker will be stationed at each wingtip to ensure adequate clearance of any obstruction in the path of the aircraft. They will be responsible for properly signaling the supervisor as soon as it appears the aircraft is in danger of colliding with an obstruction. In such cases, towing will be stopped until clearance is personally checked by the supervisor. Wing walkers are not required for helicopters being towed with rotor blades in parallel position (H-1 type helicopters parallel their rotor blades in a fore and aft trail position). Wing walkers do not require annual proficiency testing and need not be fully qualified in all towing procedures. Thorough pre-tow briefings by a qualified towing supervisor will satisfy the training requirement.

2.2.3.4. Nose Walker. A nose walker (the supervisor) will maintain a safe position in front of the towing vehicle and a clear view of both wing walkers, the vehicle driver, and the person in the pilot's seat. The nose walker will be in direct contact with the person in the cockpit either by interphone or communications media specified in applicable aircraft TOs. When tail and wing walkers are not required, the nose walker (supervisor) may ride in the cab of the tow vehicle where the supervisor can observe the path to be traversed and direct the actions of the cockpit brake person and the vehicle operator.

2.2.3.5. Tail Walker. A tail walker will be used during towing operations when the aircraft is to be turned sharply or backed into position. Backing of aircraft will be avoided as much as possible. A tail walker will be required when backing an aircraft into a HAS with permanent chocks installed. Tail walkers do not require annual proficiency testing and need not be fully qualified in all towing procedures as long as this is their only task. Thorough pre-tow briefings by a qualified towing supervisor will satisfy the training requirement. **NOTE:** Where movement of small aircraft is accomplished, the tail walker may be eliminated at the discretion of the tow team supervisor. The use of a tail walker in third generation HAS may also be eliminated at the discretion of the supervisor. Earlier generation HAS do not have sufficient clearance to allow the elimination of the tail walker.

2.2.4. Steerable Gear. Steerable landing gear (including outriggers) will be set in tow position before the aircraft is moved and returned to original position after the tow bar has been removed. The supervisor will ensure personnel in the cockpit have been instructed to allow the nose gear steering wheel to turn freely and not to attempt to steer or turn the nose wheel any time the tow bar is connected to the aircraft.

2.2.5. Personnel Riding or Walking. Under no circumstances will personnel walk between the nose wheel of an aircraft and its towing vehicle, nor will they ride on the outside of a moving aircraft, on the tow bar, or on the outside of the vehicle unless an authorized seat is provided. No person will attempt to board or leave a moving aircraft or towing vehicle.

2.2.6. Night Crew Signals. Two luminous wands will be issued to towing team members who require wands. The use of wands by the towing team supervisor will be required even when the aircraft interphone contact is established with the towing team supervisor, the towing tractor operator, and the brake person in the cockpit. Wands or wingtip lights will be used by other tow team members, as required, to warn any aircraft traffic that may approach.

2.2.7. Control Tower Clearance. Before towing an aircraft on or across an established taxiway or runway, the supervisor will obtain clearance from the control tower. At no time will any aircraft be towed on or across runways or taxiways without advance approval of the control tower. The primary means of communication will be the aircraft radio. An alternate method (when conditions restrict aircraft battery operation) is through an escort vehicle in direct radio contact with the control tower. The radio-equipped escort vehicle will accompany the aircraft throughout the towing operation.

2.2.8. Towing Speed. Towing speed will not exceed that of walking team members, with a maximum of 5 miles per hour.

2.2.9. Brakes. To prevent serious mishaps, aircraft brake systems will be charged before each towing operation, and towing will be stopped immediately if brake pressure drops below safe operating limits. Aircraft with faulty brakes will not be towed, except to repair facilities, and then, only with personnel standing by ready with chocks for emergency use.

2.2.10. Tow Bars. Before moving any aircraft, the towing vehicle, tow bars and connections, and other associated equipment will be inspected by the tow team supervisor for defects. Only authorized equipment in good condition will be used in towing operations.

2.2.11. Chocks. Chocks will be immediately available in case of emergency throughout towing operations and will be properly placed before the towing vehicle is unhooked. When towing or parking aircraft with snow, ice, or frost present anywhere on the parking ramp or towing surface, sand bags and chocks will be available and used. Heavier tow vehicles with chains will be used to improve starting and stopping traction during tow operations on ice- or snow-covered towing surfaces. Chocks or other support equipment will not be placed on or hung from any part of the aircraft exterior during towing or repositioning.

2.2.12. Starts and Stops. When moving aircraft, tow vehicle operators will not stop and start suddenly. Aircraft brakes will never be applied when an aircraft is being towed, except in emergencies and upon instructions given by any team member. Before the towing vehicle is unhooked from the aircraft, chocks will be properly placed and the aircraft's brakes set.

2.2.13. Equipment, Stands, and Similar Materials. The supervisor will ensure all equipment, workstands, loose aircraft parts, and other materials are removed from the vicinity of an aircraft and are properly stored. When any equipment or materials are left outside, they will be secured to prevent accidental movement by winds or jet and propeller blasts.

2.2.14. Entrance Doors, Ladders, and Down Locks. To avoid possible worker injury and aircraft damage during towing operations, entrance doors will be closed, ladders will be retracted or removed,

and landing gear down locks installed. The only allowable deviations from these requirements will be according to specific aircraft TOs.

2.2.15. Struts and Tires. Prior to towing any aircraft, towing team members will check nose and main landing gear struts and tires for proper inflation. Unless the applicable TO requires a gauge check, a visual check of tires and struts will be adequate for towing purposes.

2.2.16. Docks. When a multi-engine aircraft with four blade propellers is moved (particularly into and out of docks), the following precautions will be taken to avoid possible damage:

2.2.16.1. Place propellers in an "X" position or in a position determined to be suitable for the aircraft and dock combination.

2.2.16.2. Maintain landing gear main strut and nose gear strut extension suitable for the aircraft and dock involved.

2.2.16.3. Inflate or deflate tires as necessary to provide required clearances, but do not exceed minimum or maximum pressures.

2.2.16.4. Keep hydraulic brake pressure at or above safe minimums.

2.2.16.5. Station two team members in a position to observe the top clearance of propeller blades.

2.2.16.6. Clear ramps of snow and ice for a distance of 100 feet in front of the dock doors and far enough to each side to accommodate all landing gear wheels.

2.2.17. Towing Vehicle Inspections:

2.2.17.1. Tow vehicle operators will ensure all towing equipment is serviceable and functioning properly before starting any towing operation.

2.2.17.2. Before the tow bar is hooked to the aircraft, the tow team supervisor will inspect the tow vehicle for defects or extraneous material that may interfere with safe operation.

2.2.17.3. The unit vehicle control plan will ensure a qualified operator inspects each tow vehicle at least once each shift to see that the cab and bed are clear of all extraneous materials and the vehicle is in safe working condition. Towing connections will be inspected before each use. Pintle assemblies and towing connections will be secured with a pintle hook safety or cotter pin that will positively lock towing connections. When mechanical defects affecting safety are found on tow vehicles, the equipment will be taken out of service and reported to vehicle maintenance for repairs.

2.2.18. Approach of Towing Vehicle. When approaching the aircraft to be moved, the tow vehicle driver will stop at least 50 feet from the aircraft and proceed only on specific instructions from the tow team supervisor.

2.2.19. Towing Clearance. The towing vehicle distance behind another aircraft or another vehicle will not be less than 50 feet. Greater distances (at least 150 feet) will be used when towing aircraft with faulty brakes.

2.2.20. Towing Aircraft Without Access to Cockpit. When cocooned aircraft without seat, brakes, or closed and sealed canopies are moved, chocks will be immediately available throughout towing operations in case of emergency.

2.2.21. Engine Operation. As a general rule, aircraft will not be towed with engines operating. The following two exceptions apply to aircraft towing operations with engines running:

2.2.21.1. Civilian contract air carrier jet engine transport aircraft may be towed or pushed short distances with engines operating according to Federal Aviation Administration-approved procedures contained in operations and maintenance handbooks. Copies of these procedures should be carried aboard the aircraft.

2.2.21.2. Air Force aircraft may be pushed back with engines running to support non-routine or abnormal operational requirements. These push-back procedures will be supported by engineering analysis and published in the aircraft Dash-1 TO.

2.3. Taxiing Operations. Aircraft will not be taxied closer than 100 feet to an active runway where aircraft are operated unless they are taxiing on an established taxiway. Wing walkers will be used when the aircraft is taxied within 25 feet of an obstruction. Wing Commanders may waive this provision for locally based aircraft, if established taxi lines are marked and obstructions are either permanent or other aircraft parked are on established parking spots or lines. Aircraft will not be taxied within 10 feet of an obstruction, unless under one of the following circumstances:

-- During contingency operations when compliance would restrict the mission.

-- From alert, readiness, or protective shelters. A plainly visible centerline must be painted along the exit path and a marshaler will be used.

-- Operating locally based aircraft from parking spots specifically designed for those aircraft. Parking spots will have a minimum 10-foot wingtip clearance between aircraft and clearly marked taxi routes, and support equipment shall be placed in designated locations. A marshaler will be used.

NOTE: On aircraft with swept-back wings, the wingtip path extends beyond the straight line path when the aircraft is in a turn. The amount depends on the degree of turn and the degree of sweep on the wings.

2.3.1. Cleaning of Canopies and Windshield. The aircraft canopy and windshield will be clean before the aircraft is taxied.

2.3.2. Lights. Aircraft position lights will be ON from just before engine start until engine shutdown. The following aircraft are exempt:

2.3.2.1. T-38 and C-21 aircraft during daylight hours.

2.3.2.2. Jet aircraft in approved sound suppressers.

NOTE: Special care will be exercised to not blind the directing ground crew members when taxiing with landing lights on (AFI 11-218).

2.3.3. Doors and Hatches. Personnel will comply with operating instructions and checklists for securing doors and hatches before starting engines, taxiing, or actual flight. Unless a specific requirement exists, no aircraft will be taxied with open doors or hatches. Aircraft commanders will brief all personnel on board that they will not attempt to leave or enter the aircraft while it is in motion. If a door

warning light comes on during taxiing, the aircraft will be brought to a complete stop when operational or airfield constraints allow, and the cause for the warning will be determined.

2.3.4. Communications. Aircraft will not be taxied without clearance. Radio contact will be maintained with the control tower throughout taxi operations. Taxi speeds in uncongested areas will be reasonable, with the safety of the aircraft and personnel the determining factors. Standards outlined in Dash-1 handbooks will govern taxi operations under varying wind conditions.

2.3.5. Crossing Behind Aircraft. Personnel, vehicles, and towed aircraft will remain clear of taxiing traffic and will not pass within 200 feet of the rear of an aircraft with engines running.

2.3.6. Ramp Areas. Aircraft parked in ramp areas will be taxied only after an "ALL CLEAR" signal is given by a responsible ground crew member.

2.3.7. Signaling at Night. At night, ground crewmembers will use two luminated wands for signaling taxiing aircraft (paragraph **2.2.6.**). Refer to AFI 11-218 for additional information and details.

2.3.8. Taxiing Near Other Aircraft. Pilots and taxi-qualified technicians will use minimum power when moving from a row of parked aircraft and will taxi in a way that prevents blast from propellers or jet exhausts from endangering personnel, parked aircraft, or other property. The minimum safe distance to the rear of a jet aircraft operating at 100-percent power setting has been established as the point where blast effects do not exceed 35 miles per hour velocity and 38 degrees Celsius (C) (100 degrees Fahrenheit [F]). See aircraft TOs for recommended safe distance.

2.3.9. Jet Runup Areas. Adequate caution signs will be posted at entrances, gates, and other approaches to jet runup areas to direct attention to the hazards of such operations.

Attachment 7

CHECKLIST FOR CHAPTER 2--TOWING AND TAXIING AIRCRAFT

This is not an all-inclusive checklist. It simply highlights some critical items in this chapter. Other requirements exist in the chapter that are not included in the checklist. Where appropriate, MAJCOMs, DRUs, FOAs, local ground safety offices, and supervisors will add to this checklist to include command or individual shop-unique requirements or situations.

A7.1. Are tow team personnel prohibited from placing themselves in the direct path of aircraft wheels or riding on any external part of an aircraft or tow vehicle? (Reference paragraph **2.2.**)

A7.2. Are newly assigned aircraft maintenance specialists required to pass a proficiency test on the types of aircraft towed after they complete OJT? Are towing supervisors, nose walkers, cockpit brake person, and tow vehicle operator fully qualified, trained, and administered annual proficiency tests? (Reference paragraph **2.2.1.**)

A7.3. Is the supervisor the only team member authorized to give the "all clear to move" order? (Reference paragraph **2.2.2.**)

A7.4. Can the supervisor always see both wing walkers, the vehicle driver, and the person in the pilot's seat and maintain direct contact with the person in the cockpit? (Reference paragraph **2.2.3.4.**)

A7.5. Are personnel prohibited from walking between the aircraft nose wheel and a tow vehicle? Do they also know not to ride on the outside of a moving aircraft, on the tow bar, or on the outside of the vehicle unless an authorized seat is provided? (Reference paragraph **2.2.5.**)

A7.6. Do tow team members use luminous wands when aircraft is towed at night? (Reference paragraph **2.2.6.**)

A7.7. Are inspections of towing equipment performed as stated in paragraph **2.2.17.**?

A7.8. Does the supervisor ensure the proper taxiing distances, wing walkers, signal persons, etc., are used? (Reference paragraphs **2.2.**and **2.3.**)

A7.9. Prior to taxi, is radio contact established and maintained with the control tower? (Reference paragraph **2.3.4.**)

A7.10. Is only minimum power used when moving an aircraft from a row of parked aircraft? (Reference paragraph **2.3.8.**)