



AIRCRAFT GROUND OPERATION

The ground handling tasks which may be necessary during the normal day-to-day operation of an aircraft and details the procedures and precautions which are generally specified. These tasks vary considerably according to the size and type of aircraft concerned and the layout of the aircraft systems; this Safety Bulletin, be read in conjunction with the appropriate Maintenance Manual, where information relating to the aircraft will be found.

GENERAL

- The tasks which may be required to be carried out on an aircraft between flights, apart from routine maintenance. Special ground equipment is often required to enable these tasks to be carried out satisfactorily; in the case of light aircraft operations this equipment may be of a very rudimentary nature, but when dealing with large transport aircraft more sophisticated equipment may be necessary.
- When an aircraft has to be moved into a hangar in order to allow servicing operations or maintenance to be carried out, it should be positioned so as to avoid obstructing access to other working space or necessitating disturbance before the work is complete. Account should also be taken of the location of all necessary facilities such as weighing platforms, electric and pneumatic power sources, lighting and of the necessity for providing docks or platforms to enable the work to be carried out.

TOWING

It is often necessary to move an aircraft without starting the engines, in order to position it for servicing or to enable passengers or cargo to be loaded, if this operation is not carried out properly, severe damage can be caused to the aircraft. Should it be necessary to call upon the assistance of untrained or inexperienced persons to move the aircraft, the person taking charge should instruct them adequately before starting and ensure that they fully appreciate what they are required to do.



- The precautions to be observed, but detailed information relating to the movement of a particular aircraft will be found in the manufacturer's Maintenance Manual for the aircraft concerned.
- On aircraft with a steerable nose wheel connected to the yaw pedals, care must be taken not to exceed the turning limits, which are normally marked on the nose undercarriage leg. On this type of aircraft, it is also important that the rudder controls are not locked during towing operations.
- When towing a light aircraft by means of a tractor, the correct tow-bar should be connected between the towing attachment at the base of the nose undercarriage leg and the tractor; a person familiar with the aircraft brake system should be seated in the cockpit/cabin to operate the brakes in an emergency; the brakes should not normally be applied unless the aircraft is stationary.

AIRCRAFT PARKING

When an aircraft is out of service and in the open, it should be secured against inadvertent movement and protected against adverse weather conditions. The operations which are recommended in the relevant Maintenance Manual depend on the type of aircraft, the length of time it will be out of service and the prevailing or forecast weather conditions.

- For helicopters, in addition to the actions, the rotor blades should be tethered whenever possible, since even light gusting winds can cause damage to blades which are free to flap. The collective pitch lever should normally be locked in the fully fine position and the rotor brake applied. Rotor head and blade covers should also be fitted if the helicopter is parked overnight, if high winds are expected it should be hangared or the rotor blades should be folded.
- On many helicopters the main rotor blades are tethered by aligning one blade along the tail cone, locking the collective pitch lever in fine pitch and applying the tip covers to each blade, pulling them against the damper stops. Each blade may then be lashed to its respective picketing point, but care must be taken not to pull the blades down excessively; the relevant Maintenance Manual will generally stipulate a maximum distance from the normal drooped position which must not be exceeded. The tail rotor is generally tethered by fitting the blade covers and securing them to the associated picketing point or tail skid.
- The method of folding the main rotor blades depends on the method of attachment to the rotor head and on the position of each blade; the procedure for a particular helicopter should, therefore, be obtained from the relevant Maintenance Manual. In the folded position the blade tips are generally secured by means of support cradles, which are attached to the tail cone structure.

JACKING

An aircraft may have to be jacked up for a variety of reasons, including servicing, weighing, changing wheels and retraction tests and care is necessary to avoid damaging the aircraft. Jacking points are provided in the wings and fuselage to enable the whole aircraft to be lifted, and usually, at the nose and main undercarriages to enable individual wheels to be changed. Some aircraft require a jacking pad to be fitted to each jacking point in the wings and fuselage and adapters to be fitted to the jacks, while in other cases special stirrups or beams may be required to lift individual axles.

- As a safety precaution, light aircraft should normally be jacked inside a hangar, but large aircraft may be jacked in the open provided that they are headed into wind and the surface is level and strong enough to support the weight of the aircraft at the jacking points. A maximum safe wind speed for jacking is generally specified in the relevant Maintenance Manual.
- Before lowering an aircraft to the ground, all ground equipment, work stands, supports, etc., should be moved clear of the aircraft structure to prevent inadvertent, the wheels should also be rotated by hand to check that the brakes are free. The jacks should be lowered slowly in unison, by opening their pressure release valves, and, to guard against failure of a jack, the locking nuts on the jack rams should be unscrewed while the jacks are lowered and kept within 50 mm (2 in) of the jack heads. The jacks should be fully lowered after the aircraft is resting on its wheels and the pressure release valves should be closed. Chocks should then be placed in position, the jacks, jacking pads and adapters should be removed from the aircraft and any electrical circuits which were disarmed as a safety measure should be reinstated.



SERVICING

Servicing may often be carried out in a crowded environment and must be properly organised to ensure that the necessary operations are carried out, to provide adequate safety to passengers and ground crew and to protect the aircraft from damage.

It is also advisable to wear clothing without buttons or buckles which could scratch the wing surface, and, without pockets in which loose tools could be carried, since they could fall out and become a loose-article hazard.

- **Ground Equipment**

Many types of ground equipment may be required during aircraft servicing and all must be compatible with the aircraft systems on which they are to be used. The ground equipment should be kept scrupulously clean and should be maintained in accordance with a schedule recommended by the manufacturer. Delivery pipes from all liquid and gas servicing trolleys should be blanked when not in use and their cleanliness and serviceability should be checked before connection to an aircraft.

- **Refuelling**

Before refuelling it should be ensured that the refuelling vehicle contains the correct grade of fuel, as shown at the refuelling points on the aircraft. Precautions should be taken to provide a path to earth for any static electricity which may be present or which may build up as a result of the fuel flow. The aircraft and the refuelling vehicle should be earthed to a point which is known to be satisfactory and the earthing wire on the refuelling pipe should be connected to the earth point provided on the aircraft before connecting the refuelling pipe or removing the tank filler cap. the aircraft and/or the refuelling vehicle. No radio or radar equipment should be operated while refuelling or defueling is taking place and only those electrical circuits essential to these operations should be switched on.



- **Connection of Electrical Power**

It is often necessary to connect an external electrical power supply to an aircraft, either for engine starting purposes or to permit operation of the aircraft systems and equipment. Certain precautions must be observed when connecting the external supply, to prevent damage to the aircraft electrical system. Most light aircraft have direct current (d.c.) electrical systems and although alternating current (a.c.) is provided for the operation of certain equipment it is not usual for the aircraft to have provision for the connection of a.c. external power. The external power socket is, therefore, usually for the connection of a d.c. supply, which may be provided solely by batteries or from a generator and battery set.

- **Cleaning**

Cleaning an aircraft improves its appearance and aerodynamic qualities, helps to prevent corrosion and facilitates the detection of fluid leakage. It is, therefore, often included in the servicing schedule.

- **Replenishment of Liquids**

The utmost care should be taken to ensure that only the approved liquids are used and that no foreign matter is allowed to enter the system. Servicing trolleys should be inspected regularly for cleanliness and their delivery pipes should be capped when not in use; all utensils should be kept scrupulously clean and should, preferably, be retained for use with one particular liquid.

- **Lubrication**

When lubricating a component, care should be taken to ensure that the quantity applied is adequate but not excessive. The lubricating point should be wiped clean and dry with a lint-free cloth before applying the oil or grease, any excess exuding from the component should be wiped off to prevent the accumulation of dirt or foreign matter.

AIRCRAFT MARSHALLING

Marshalling is one-on-one visual communication and a part of aircraft ground handling. It may be as an alternative to, or additional to, radio communications between the aircraft and air traffic control. The usual equipment of a marshaller for their visibility and safety is a reflecting safety vest, a helmet with acoustic earmuffs, and gloves or marshalling wands—handheld illuminated beacons.



AIRCRAFT MARSHALLING SIGNALS



HOLD/STEND BY



PLACE YOURSELF
FACING ME



NORMAL STOP



TURN LEFT



TURN RIGHT



CHOCKS INSERTED



CHOCKS INSERTED



EMERGENCY STOP



STOP ENGINES



START ENGINES



PROCEED



CHOCKS REMOVED



CHOCKS REMOVED



MOVE AHEAD



MOVE BACK



CONNECT
TO GROUND POWER



DISCONNECT
TO GROUND POWER



STRAIGHT AHEAD



SLOW DOWN



MOVE BACK



ALL CLEAR



NEGATIVE



ESTABLISH
COMMUNICATION