



Flight Line Marshaller

Home Study Course



Flight Line Marshaler Course

Purpose

The purpose of this course is to provide an overview of flight line operations to the new Flight Line Marshaler. This course is required by CAPR 60-3 for qualification as a Flight Line Marshaler Trainee and for the issuance of a CAPF 101T-FLM. Flight Line Supervisors require an additional course after qualifying as a Flight Line Marshaler.

Agenda

This course is divided into four modules:

- Module 1: Flight Line Team
 - Team composition & equipment
- Module 2: Flight Line Safety
 - Emergencies; aircraft fires, FOD
- Module 3: Flight Line Operations
 - Flight Line area; aircraft handling, servicing, & marshaling; flight line night operations

Flight Line Marshaler's Responsibilities

The Flight Line Marshaler's duty area is the Aircraft Operating Area (AOA) (figure 1), ramp, apron, or as it's known in CAP and the term that will be used in this course, the flight line. The flight line is that portion of the airfield where aircraft taxi, are parked, and serviced. Most air operations of a CAP mission are conducted at an airport with a Fixed Base Operator (FBO). The FBO offers a wide array of pilot services including certified maintenance, line service, flight training and aircraft sales. They "own" the flight line where we conduct air operations and so you may be required to work along with the FBO's attendants in the performance of your duties.

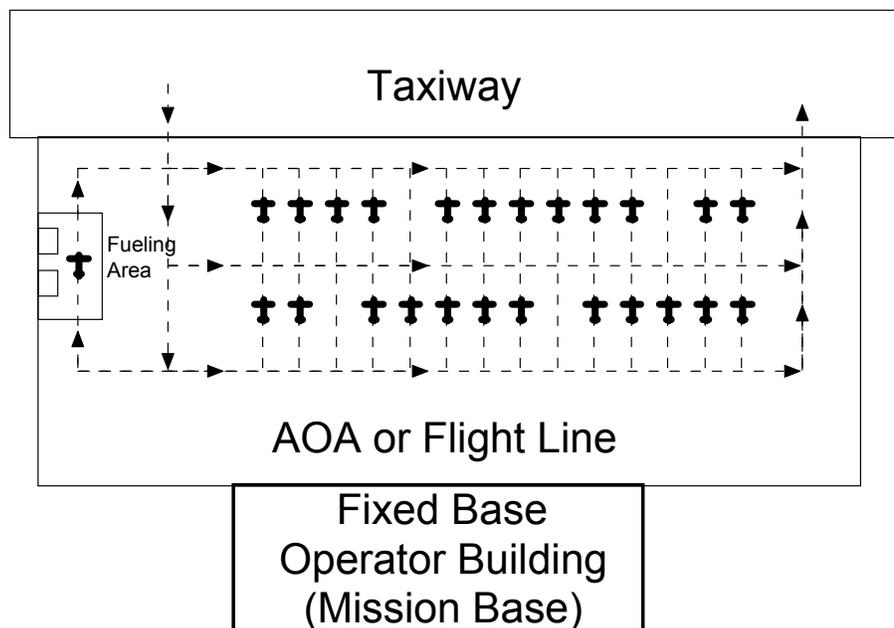


Figure 1 - Typical Aircraft Operating Area or Flight Line

Some of the usual duties that a Flight Line Marshaler may be asked to perform are:

Marshaling Aircraft – directing and parking aircraft to and from sorties.

Servicing Aircraft – fueling, handling, tie-down

Ramp Checks – usually are done by a ground team, but you may be asked to help.

Safety and Security – help keep “tourists” out (primary for safety rather than security reason).

Module 1: Flight Line Team

Flight Line Team Overview

- Team Composition
- Flight Line Supervisor
- Team Equipment

Team Composition

The flight line team normally consists of two different types of team members, a Flight Line Supervisor (FLS) and a number of Flight Line Marshalers (FLM). The FLS is the leader of the team and is always required. He reports to the Air Operations Branch Director (figure 2), provides supervision of flight line team members and coordination with other mission staff members. The bulk of the team is made up of FLMs who are qualified to perform a variety of flight line tasks required during a mission. These tasks will be discussed later in the course.

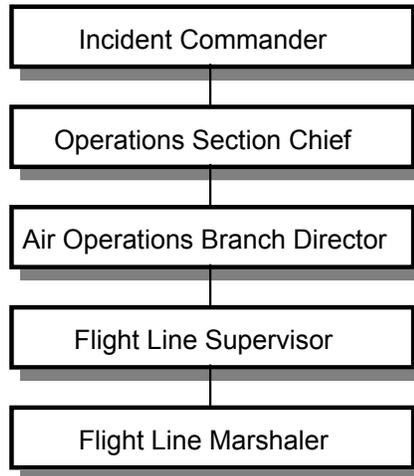


Figure 2 – Flight Line Team Chain-of-Command

The team may also consist of both Flight Line Supervisor Trainees (FLS-T) and Flight Line Marshaler Trainees (FLM-T). A FLS-T is considered a FLM since he must be a qualified FLM in the first place. The FLS is responsible for the care of his assigned trainees. No more than half of a flight line team can be made up of trainees. Furthermore, each trainee must be assigned to a trainer. That is, a FLS-T is paired-up with a FLS and each FLM-T with a FLM. The “trainer” will demonstrate and provide hands-on on-the-training (OJT) opportunities for the trainee. Because the flight line is a hazardous work environment, extreme care must be exercised when conducting training. All trainees, especially FLM-Ts because of their inexperience, must not be separated from their trainers.

Flight Line Supervisor

The Flight Line Supervisor provides direction for all activities on the flight line. He is responsible for all that happens or concerns his assigned team and must ensure team member safety at all times. It is very important to remember that if any safety concerns come up, you must inform your FLS.

The FLS is also responsible for team proficiency. He may, if necessary, disqualify a team member if safety is a concern or if he feels further training may be required. Finally, when you are assigned to a flight line team and you have any questions or are not sure about a task, don't hesitate to ask your FLS!

Team Equipment

Clothing

Forget your nicely-pressed inspection-ready service uniform! Flight line work is a "dirty" job but, of course, someone has to do it or the mission won't get done! The standard CAP Battle-Dress-Uniform (BDU) is the uniform of choice when performing aircraft marshaling assignments. Additionally, all personnel should have adequate clothing available (jackets, gloves, etc) for working in cold temperatures if necessary. During warm temperatures, personnel may remove their BDU shirts while on the flight line. Ensure that BDU shirts and other personnel items are placed where they would not be blown back onto the flight line.

High-Visibility Vests

All personnel marshaling aircraft must wear high-visibility clothing. This may be an international orange vest worn over normal duty uniforms, or as in California Wing, the high-visibility orange CAWG Ground Team uniform shirt (if you are authorized to wear one). Aircrew members traveling to and from their aircraft do not need to wear high-visibility clothing, however if conditions warrant, the FLS may consider having aircrew members escorted to and from their aircraft by flight line team members.

During the hours of reduced visibility, all personnel must wear a vest with reflective material on it. In addition, aircraft marshalers shall have high-visibility wands available during the day, and operating flashlights with visibility cones attached at night. Cone color shall be the same for both flashlights.

Headgear

Your BDU cap is not normally worn on flight lines. However, there may be situations such that marshalers may want to wear headgear during CAP aircraft marshaling. This may be because of intense sunlight, rain, or just for warmth. If worn, though, they should be secured somehow. Hat retainer devices may be locally purchased or fabricated, to help secure the hat. But it is VERY important to remember that should a hat or anything be blown from a marshaler's head, let it go! Under NO circumstance should a marshaler run on the flight line. Carefully walk and retrieve it. It is mandatory, however, that head-coverings be removed and stored securely during any activities involving helicopters or if any turbine powered engines are in the area. Your FLS should brief you on headgear during his team briefing. If he doesn't, ask!

Earplugs

Hearing-loss prevention is another concern on the flight line. Hearing protection is recommended during engine start for all aircraft. During operations around turbine powered (turbojet, turbofan, or turboprop) aircraft and helicopters, American National Standard Institute¹ (ANSI) approved hearing protection MUST be worn. The use of foam type earplugs is recommended due to their low cost. Earplugs may be connected to each other for security, however this is not necessary.

Care must be exercised when wearing hearing protection. It not only blocks unwanted noise, it may also prevent you from getting the wearer's attention.

¹ The ANSI is a private, non-profit organization that administers and coordinates the U.S. voluntary standardization and conformity assessment system.

Eye Protection

Along with Mother Nature's own wind, the wind generated by spinning propellers (prop wash) can sometimes stir-up another hazard on the flight line -- blowing debris. Personnel operating in areas of blowing debris, sand, dirt, etc should have eye protection. This protection should be suitable Occupational Safety and Health Administration (OSHA) and ANSI approved goggles. However, sunglasses or spectacles may be worn. During any helicopter operation, goggles must be worn.

Sun Protection

All flight line personnel should have sunscreen (at least SPF 15) available, and should use it. Remember, a sunburn is an injury! The Flight Line Supervisor will ensure that cadet personnel have and use sun protective products as needed. Sunscreen should be applied to all exposed skin surfaces at least every two hours or per the manufacture's instructions. Lip balm containing sun protection should also be available to all aircraft marshalers. For ultra-violet protection, a good pair of UV-blocking sunglasses should be worn.

Communications

If available, flight line personnel will be equipped with short-range radios, typically CAP 26.620 MHz, 49 MHz headset radios, CAP Simplex FM radios, or FRS radios. The Flight Line Supervisor will brief you on call signs and operation of the radio.

Module 2: Flight Line Safety

Flight Line Safety Overview

- General Safety
- Flight Line Hazards
- Safety and Security
- Emergencies
- Aircraft Fires
- FOD (Foreign Object Damage/Debris)
- Personnel Breaks

General Safety

Safety is the primary concern during any emergency services operation. No activity is important enough that the safety of any personnel should be compromised, for any reason. All personnel are authorized to stop any activity on a flight line if any activity is occurring which is unsafe or perceived to be unsafe. Marshalers must be constantly on the lookout for hazards. Also, watch out for your co-worker. He may be so involved in what he is doing that he may not see a potential hazard. Contact the Flight Line Supervisor, Safety Officer, or Incident Commander if there is any concern over safety.

Safety Rules

Some general flight line safety rules are:

- Look before you walk.
- Never walk backwards.
- Wear safety vests.
- Do not wear headgear that is not secure or carry loose items.
- Listen for aircraft and "Clear Prop" warnings.

Flight Line Hazards

There are many potential hazards out on the flight line. Some examples of these hazards are taxiing aircraft, spinning propellers, fire hazards (fuel, engines), outside elements (sun, rain, cold, or lightning), dehydration, heat exhaustion, etc.

By far, the most dangerous hazard on a flight line is a spinning aircraft propeller. They are practically invisible while spinning and WILL bite into anything that makes contact with it – including YOU! Give propellers a great deal of respect! Make it a habit to always think of them as spinning so that you won't forget. A very good idea is to always approach a small high-wing aircraft from left wingtip and walk just aft of the wing towards the cabin. On some low-wing aircraft the only cabin door is on the right side. You should do the same but approach from the right side. If you do this every time you approach an aircraft it will become second nature to you. That way, you will always be a safe distance from the propeller (spinning or not) and the pilot can see you.

Safety and Security

The flight line being a hazardous place, personnel and vehicles should be kept to minimum. Remember that this is for safety reasons not for security reasons.

The only CAP personnel that should be allowed on the flight line are flight line teams and aircrews. Some of the senior ICS staff, such as the Safety Officer or Air Operations Branch Director, may visit the flight line to check on operations. They, of course, are authorized to do so. Being at a public airport you will probably have non-CAP people in the area too. These personnel could be the Fixed Base Operator's attendants or other non-CAP pilots. Remember, CAP has no control and no authority to challenge non-CAP personnel. If you feel that there is a safety concern involving non-CAP personnel, notify your FLS. He will more likely explain to them what is going on and ask them for their safety that they be cautious. Most pilots are familiar with CAP and will try to stay out of the way. If they ask you questions about what's going on and you're busy, direct them to the mission Information Officer -- CAP may recruit a new pilot!

Vehicles, like personnel, need to be kept to a minimum for safety reasons. It's hard enough to be on the look out for taxiing aircraft and having to also watch for vehicles can be a bit too much. If vehicles on the flight line are necessary, the FLM may have to remind CAP drivers that they should obey the following rules:

- Drive with driver side toward aircraft.
- 5 mph within 50 feet of aircraft. 15 mph maximum otherwise.
- Aircraft have right-of-way.
- At night, switch to parking lights with approaching aircraft.

Emergencies

When marshaling an aircraft and an emergency occurs you should indicate to the aircrew that an emergency is occurring. They may not see what is happening. Next, report the emergency immediately, using the method the FLS briefed you on. Reporting is more important than assisting in any further activities so that more help can be on the way. Next, if necessary, assist personnel on board the aircraft to exit, only if it is safe

to do so (engine has stopped, aircraft is not moving, no flame threat). Remember, that the aircrew should be wearing flame retardant clothing and aircraft marshalers typically aren't.

Aircraft Fires

One of the most dangerous hazards on the flight line is fire. A fire can occur at the re-fueling station or on an aircraft. All FLM should have fire extinguisher training and the FLS should include what do in case of a fire in his briefing.

While modern aircraft are designed to reduce the potential for a fire, there is a slight possibility that a fire may happen during engine-startup. Fireguards will attempt to extinguish fires only after the engine and prop have come to a complete stop. Operate the fire extinguisher by pulling the safety pin, and directing the extinguishing agent onto the base of the flames from the upwind side. Keep low and sweep the extinguisher back and forth. Never use water on fuel or oil fires! In the event of a fire, the local fire protection service MUST be contacted. If the fire seems out, your FLS may direct the FLMs to carefully move the aircraft into a safe location where people and property will not be damaged should the fire breakout again. Have a fireguard standing by with a fresh fire extinguisher, if available.

FOD

A hazard more for aircraft than personnel is Foreign Object Debris (FOD). FOD are small loose objects unintentionally left on the flight line that could damage an aircraft engine, propeller, rotor, or other component. You should be on the lookout for and remove any FOD material (including trash, rocks, nuts, bolts, screws, etc) (figure 3) and place them in a suitable trash receptacle. Use your pocket if you have to. A good FLS will have personnel make a line sweep to remove any FOD before flight operations begin for the day.



Figure 3 – Examples of FOD next to an aircraft tire

Night Operations

CAP does not normally perform search missions at night, but there may be situations where you may be performing operations on the flight line at periods of darkness. This may be a sortie returning at dusk or maybe a transportation flight at night. Whatever the reason, if you must marshal an aircraft in the dark, use a pair of same color light wands (flashlights with cones). During surface taxiing or parking, the pilot must stop immediately if one or both of the marshaler's wands fail. The FLM must be careful to not shine a light into the cockpit of an aircraft or the pilot's night vision will be impaired.

Personnel Breaks

It is very easy to become dehydrated while working on the flight line. You should drink enough water to keep your urine clear and copious -- if you are not going to the restroom very often, you aren't drinking enough water! Flight Line Supervisors shall ensure sufficient water is available for all personnel and that they have an opportunity to drink at least every 15 minutes.

Typically, search missions (especially during training exercises) launch aircraft in surges. Between surges, take advantage of opportunities to rest in comfortable surroundings. To prevent fatigue, rest when you have the opportunity. The FLS should brief you on how to request time for a restroom break and how meals will be handled.

Module 3: Flight Line Operations

Flight Line Operations Overview

- Ramp Checks
- Handling Aircraft
- Servicing Aircraft
- Marshaling Aircraft
- Night Operations

Ramp Checks

Ramp Checks are normally done by Ground or Urban Direction Finding Teams (UDFT). If necessary, your FLS may ask you to record the “N-number” of all aircraft on flight line and hangars and/or taxiing aircraft.

Handling Aircraft

Sometimes it may be necessary to move an aircraft to a different location on the flight line by hand. This should be done in the presence of the aircraft’s pilot or at least the FLS. He should direct you at what points on the aircraft you are allowed to push. Be aware that there are places on an aircraft exterior that can be damaged if pushed



*Figure 4 – An aircraft rudder.
One place not to push!*

(Figure 4). Some parts you do not want to touch are antennas (Figure 5), exhaust pipes, pitot tubes, and anything else that’s not designed to be pushed. At some airports the FBO may have an attendant assigned to do this for CAP.



Figure 5 – Aircraft Antennas

If you must move the aircraft by hand, there are a few things to remember. The aircraft is most easily and safely maneuvered by hand with the towbar attached to the nose wheel. Be careful not to exceed the nose gear turning angle or damage to the gear may result. This is usually 30 degrees either side of center. If the aircraft is pushed over uneven or rough surface, be cautious of any bouncing that the tail does not strike the ground.

Many aircraft wings and tails sections have been damage when they were pushed into another aircraft. It is always a good idea to use wing- and tail-walkers to watch for any possible impact. They can carry the chocks in case they are quickly needed. Whenever you are around aircraft, never stand in the propeller arc unless you’re handling the towbar. A good safety rule-of-thumb is to think of the aircraft propeller as always spinning.

When moving aircraft, you should never pull on anything except the towbar -- it would not be good to have to explain to your FLS why you pulled the engine cowling off!

On most aircraft, the only parts of an aircraft you may push are on the ends of landing gear or wing struts. Never push on the propeller spinner. On low wing aircraft, you may push along the fore/aft rivet lines of the wings.

Aircraft Tie-down



Figure 5 – An aircraft properly tied-down

Aircraft not being immediately used will be securely tied down. Also, to help prevent wind damage, if possible, park the aircraft into the wind and set the parking brake. However, the parking brake shall not be used in excess of one hour as this could result in damage to the aircraft braking system. All aircraft parked in the open shall be tied down at the three approved points (normally at the wings and tail) (Figure 5). They should also be securely chocked (Figure 6) and the flight control lock shall be installed. CAP aircraft store their tie-downs in the aircraft baggage compartment. When the aircraft is not being immediately used a pitot tube cover (Figure 7) and engine plugs (Figure 8) should be installed to preclude the infestation of bird nests, dirt daubers, etc.



Figure 6 – A typical aircraft tire chocked



Figure 7 – Pitot tube cover



Figure 8 – Engine plugs

CAUTION: Per CAPR 66-1 para. 15.c. Chains shall not be used directly from aircraft mooring points to an anchor point because of excessive impact loads on wing spars. When chain tie-downs are used, they shall be attached to wire rope anchors.

Servicing Aircraft

The aircraft pilot or a fixed base operator fuel attendant will probably be the one that will actually service an aircraft when needed. You may be directed to only assist aircrew members in refueling or servicing aircraft. This may include helping to add engine oil, holding the fuel hose, ladder, or grounding the aircraft. As a FLM, you may also be assigned to help keep track of fuel or oil used. If you are asked to clean the windshield, ask exactly what the pilot prefers you use and the procedure. Windshields are made of Plexiglas and are very easy to scratch.



Figure 9 – A typical aircraft service area

Grounding

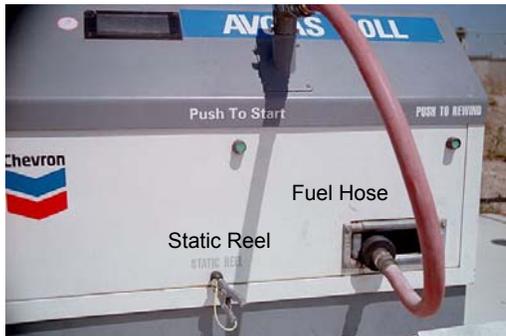


Figure 10 – A aircraft fuel station

Aircraft build up static electricity during flight. Grounding an aircraft helps to control or eliminate sparks from static electricity. This is especially important during refueling and you want to make sure the aircraft is grounded prior to fueling. You should also ground yourself before touching the fuel nozzle or aircraft.

Aircraft Fuel

Just like gasoline for vehicles, aviation fuel comes in different types. There are aviation gasoline with different grades and jet fuel. The most common aviation fuel used is Aviation Gas 100 Low Lead. It is abbreviated as AVGAS 100LL and is the grade most CAP-owned aircraft use. If you are asked to refuel an

aircraft, ensure that you have the correct fuel by asking the pilot for the proper type. Aviation fuel is color-coded to help identify its type. Always verify the color – the wrong type might have been loaded into the wrong storage tank! Here is a guide to the different fuel colors and how it relates to aviation fuels and octane:

- Avgas 80 octane color = Red
- Avgas 100 octane color = Green
- Avgas 100LL octane color = Blue
- Jet Fuel color = clear or straw color

WARNING: Per CAPR 66-1 para. 13. Automotive Fuel (MOGAS). The use of automotive fuel (MOGAS) in corporate aircraft is prohibited.

While each mission location and aircraft may be different, a refueling operation should go something like this: Before refueling begins ensure that the engine is off, the parking brake is set, wheel chocks are in place. Attach the static line to the aircraft (check with the pilot or FLS if you're not sure where for the particular aircraft your working on). If you will be adding the fuel, it is a good idea to wear safety goggles in case fuel splashes back in your face. On high-wing aircraft, place the ladder in front of the wing lined-up with the fuel cap on top of the wing. Remember to never place ladders against any part of the aircraft. Also, always allow room in case the aircraft moves or a wing drops a few inches because of wind or refueling wing fuel tanks. Have another FLM hold the ladder as you climb up. Never stand on the top couple of rungs on a step-ladder – the fuel hose is heavy and is awkward to handle and could easily cause you to fall. Have a third FLM hand you the fuel hose. Open the fuel cap and place the fuel hose nozzle into the fuel tank filler neck without touching the bottom of the fuel tank. Hold the fuel nozzle vertically straight and touching the side of the fuel tank filler neck. Never let the nozzle rest inside the fuel tank filler neck at an angle. The filler neck can be cracked from the weight of the fuel hose. Once you're in position and ready to add fuel, have the fuel pump turned on and squeeze the nozzle handle. While the fuel is being dispensed, remember to keep the nozzle vertically straight, off the bottom of the fuel tank, and touching the side of the filler neck. If you were instructed to add only a certain number of gallons of fuel, have a FLM call out the gallons from the fuel pump. If you were told to "top-of-the-tanks" (fill up the fuel tanks), stop adding fuel when the fuel is within an inch of the bottom of the filler neck. Whatever the case, release the nozzle handle when you have enough fuel and have someone shut-off the fuel pump. Next, before climbing down the ladder, hand the fuel hose to someone and replace the fuel tank cap. Make sure nothing was left on top of the wing (gloves, rags, goggles, etc.) and climb down the ladder. The pilot may want to



Figure 11 – FLMs refueling an aircraft

verify the amount of fuel in the tanks before you move the ladder, so a FLM should hold the ladder for him. If the fuel level is good, remove the ladder and static line and assist in moving the aircraft out of the service area and get ready for the next aircraft.

The FLS may assign a FLM to help keep track of fuel receipts. Don't take this job lightly! It is very important for the Incident Commander to be able to keep track of expenditures for aviation fuel and oil. Your FLS will brief you on the procedure.

Marshaling Aircraft

One of the most important duties that the FLM does is guide and marshal aircraft. On the flight line aircraft park on certain locations designated as parking spots. These spots are sometimes painted to show nose gear location and may also include a tie down cable or chains. A pilot reporting for a mission or returning from a sortie may not know exactly where to park. The FLM job is to guide him to "his" spot. Verbal communication between the pilot and FLM is not usually possible so communications must be done through standardized hand signals.

Before we go through the hand signals you should know where to stand. For safety reasons and so the pilot has a clear view of your signals you, go to the spot where you plan to park the aircraft. The best place to stand is forward of the aircraft in full view of the pilot but not directly in front of the propeller. Visualize where the aircraft's left wing will be when it's parked and stand approximately aligned anywhere from the wing's mid-point to the wing tip. If it may be difficult for the taxiing pilot to see you at the parking spot, use another FLM to guide him to your location. A mistake some new marshalers make is that they meet the aircraft while it's taxiing-in and walk backwards to the spot while marshaling the aircraft in. This is dangerous! You cannot see where you're going and if you turn around to see where you're going -- you're not watching where the taxiing aircraft is going! You could also fall backwards (not a good thing when you have a taxiing aircraft coming towards you) or you may walk backward into another spinning propeller. You should also always stand far enough away that you can easily get out of the way of the aircraft. Maintain eye contact with the pilot. If you can't see him, he can't see you. If you're parking an aircraft next to another aircraft, the FLS may want to assign a wing-walker (or two wing-walkers if parking between two aircraft) to keep an eye on the wingtip. If you have the rare chance to marshal in a helicopter, remember the pilot usually sits on the helicopter's right side so stand on that side where he will have a clear view of you.

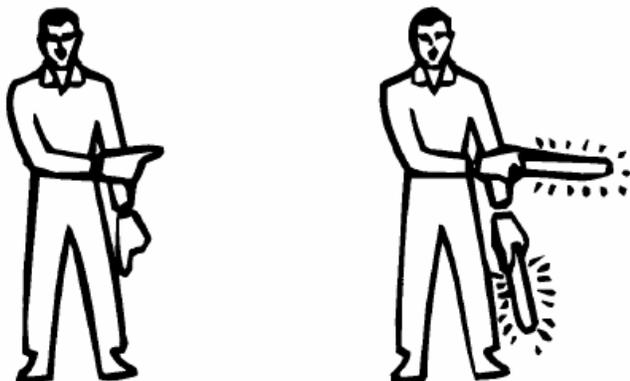
Aircraft Marshaling Signals

The standardized aircraft marshaling signals that CAP uses come from Air Force Instruction 11-218 Aircraft Operation and Movement on the Ground, 26 May 1994 and is also in the Aeronautical Information Manual (AIM 4-3-25). The signals you need to learn and must demonstrate to qualify as a FLM are as follows (both signals for daylight and nighttime are given):

Part A--Ground Movement Signals for all Aircraft (Signals 1 Through 15)

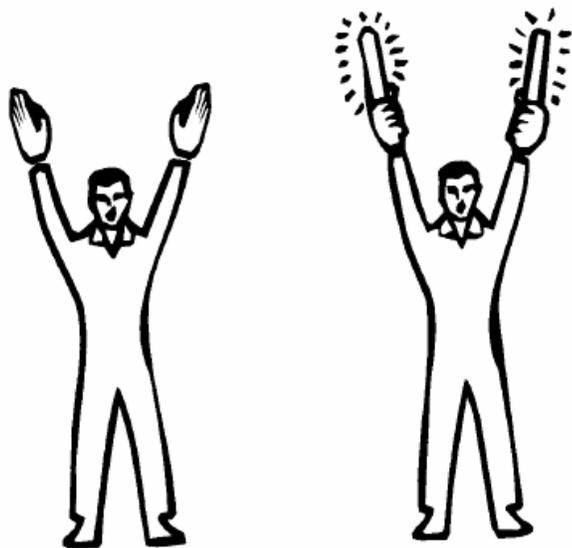
1. PROCEED TO NEXT MARSHALER

Right or left arm down, other arm moved across the body and extended to indicate direction of next marshaler.



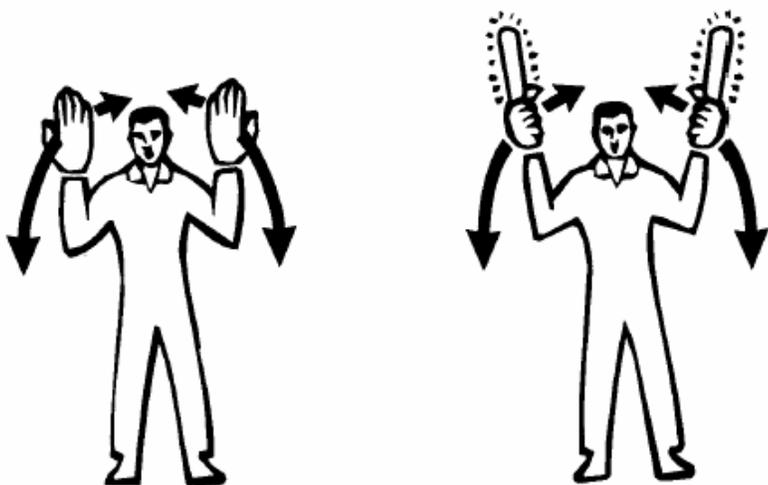
2. THIS MARSHALER

Arms above head in vertical position with palms facing inward.



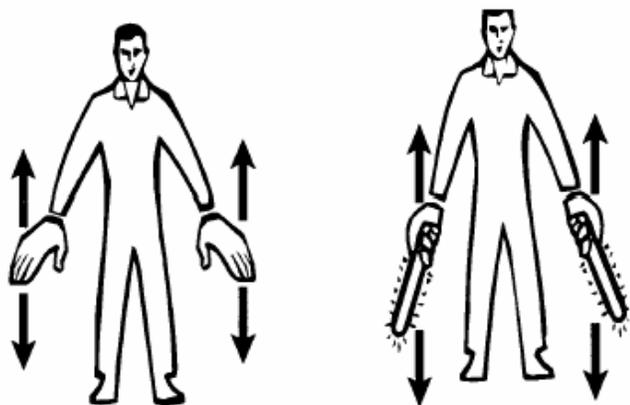
3. MOVE AHEAD

Arms a little aside, palms facing backwards and repeatedly moved upward-backward from shoulder height.



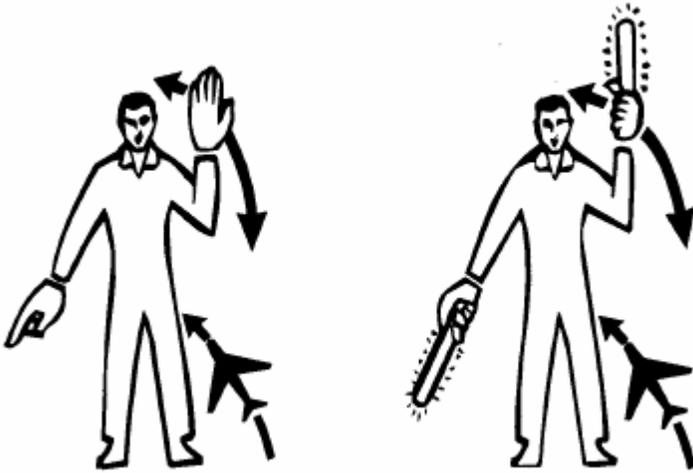
4. SLOW DOWN

Arms down with palms toward ground, then moved up and down several times.



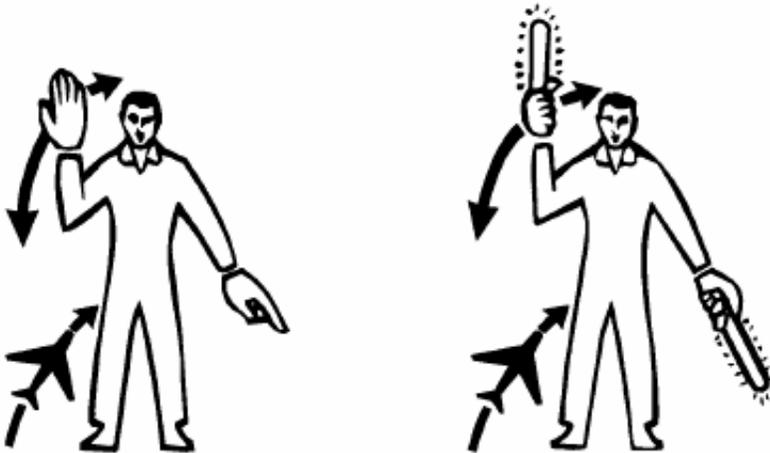
5. TURN TO THE LEFT

Point right arm downward, left arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.



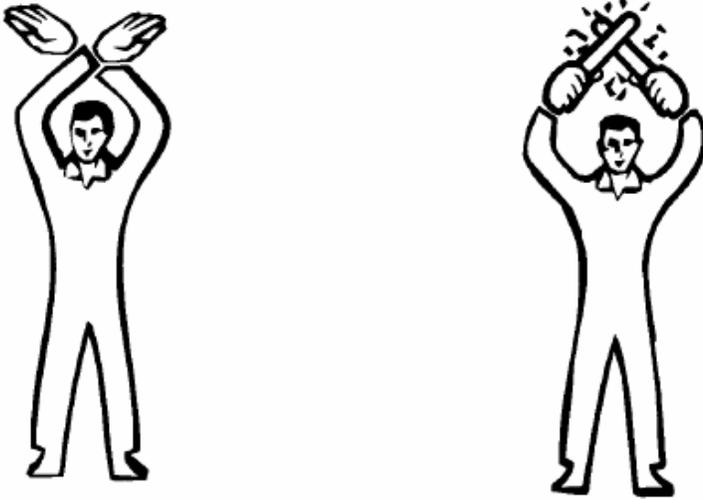
6. TURN TO THE RIGHT

Point left arm downward, right arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.



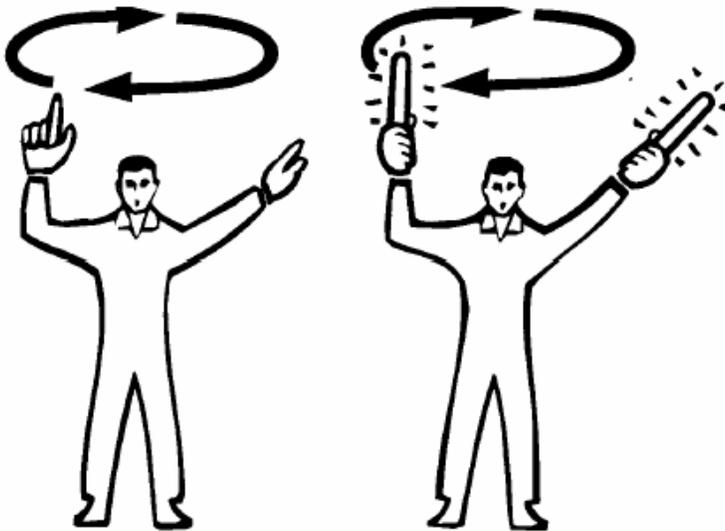
7. STOP

Arms crossed above the head, palms facing forward. This is the FAA signal for emergency stop.



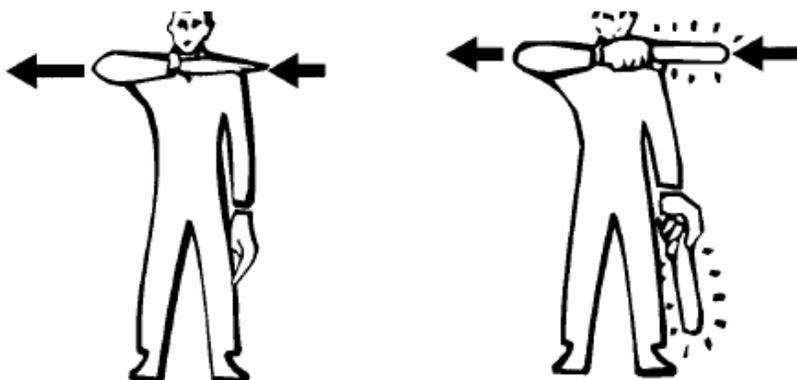
8. START ENGINE(S)

Circular motion of right hand at head level with left arm pointing to engine.



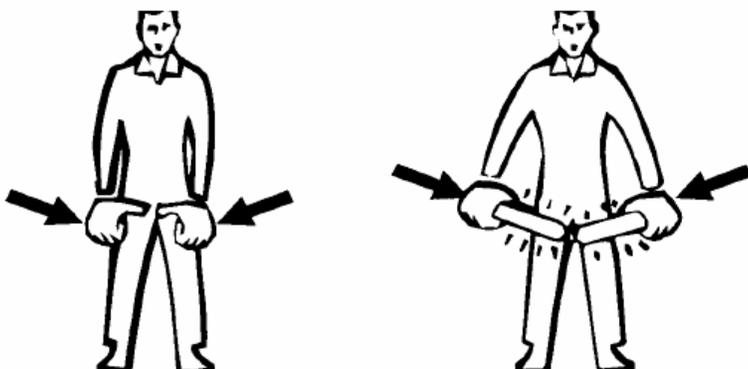
9. CUT ENGINE(S)/ROTOR

Either arm and hand level with shoulder, hand moving across throat, palm downward.



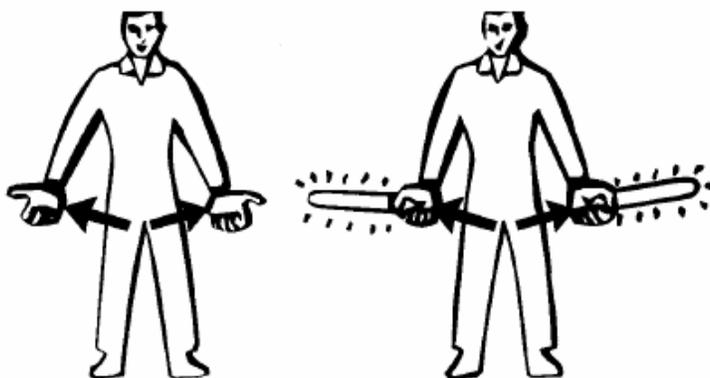
10. CHOCKS--INSERTED

Arms down, fists closed, thumbs extended inwards, swing arms from extended position inwards.



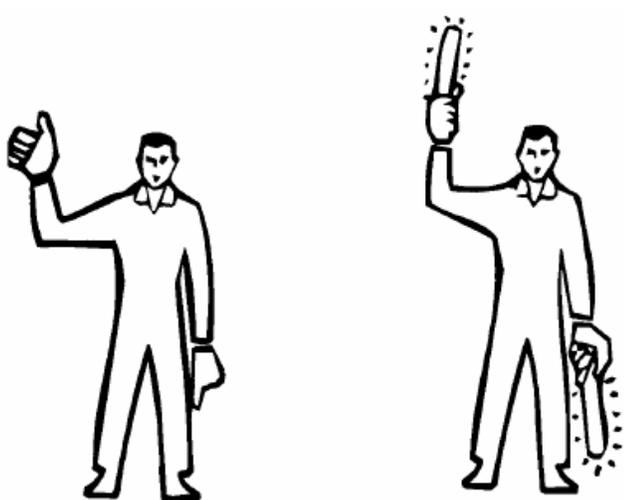
11. CHOCKS--REMOVED

Arms down, fists closed, thumbs extended outwards, swing arms outwards.



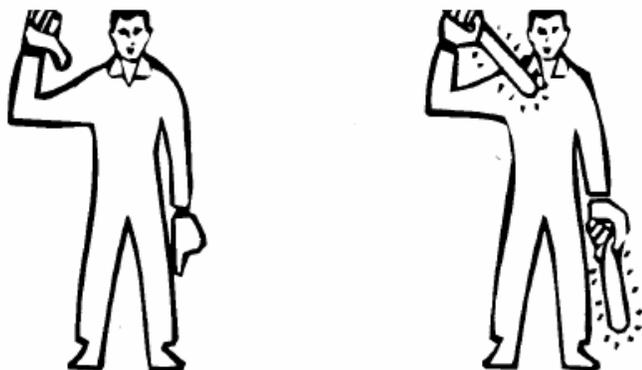
12. AFFIRMATIVE (ALL CLEAR OR "OK")

Hand raised, thumb up.



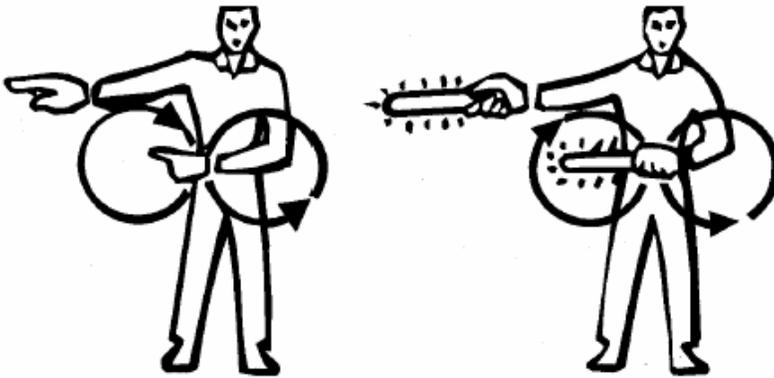
13. NEGATIVE (NOT CLEAR)

Arm held out, hand below waist level, thumb turned down.



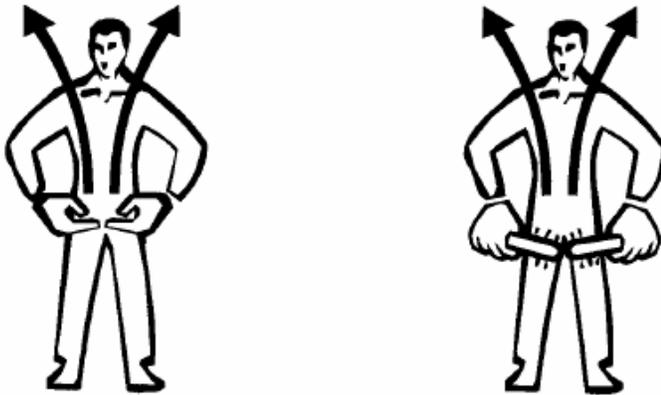
14. FIRE IN THE ENGINE

Make rapid horizontal figure-of-eight motion at waist level with either arm, pointing at source of fire with the other.



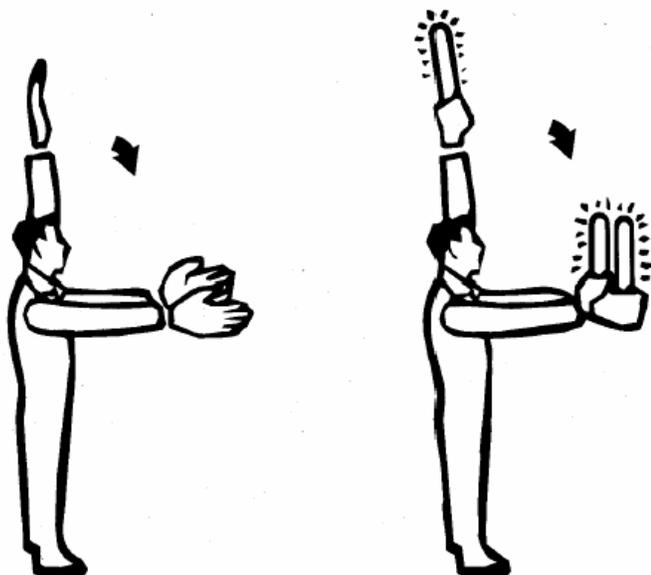
15. ABANDON AIRCRAFT

Marshaller first gives signal to cut engines, followed by signal simulating unfastening seat belt and shoulder straps and throwing them up and off.



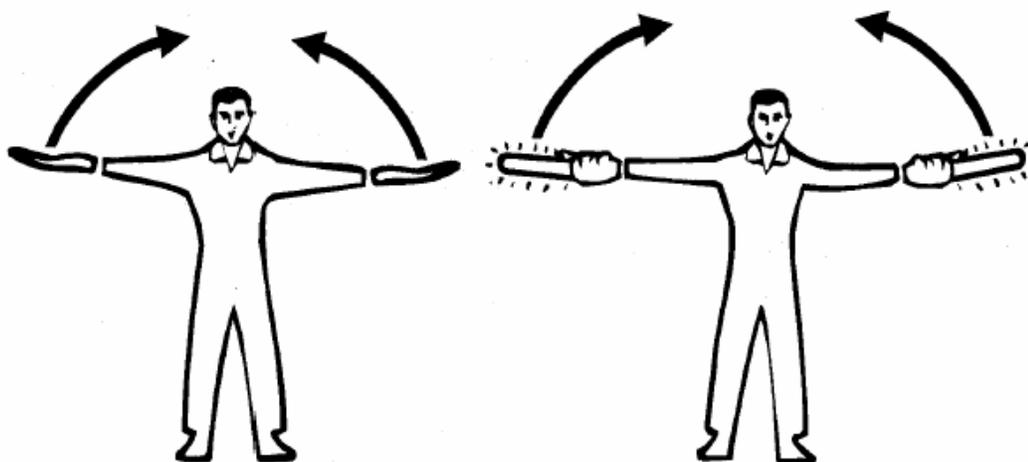
16. LANDING DIRECTION

Marshaler turns and faces toward point where aircraft is to land, the arms are lowered repeatedly from a vertical position to a horizontal position, stopping finally in the horizontal position.



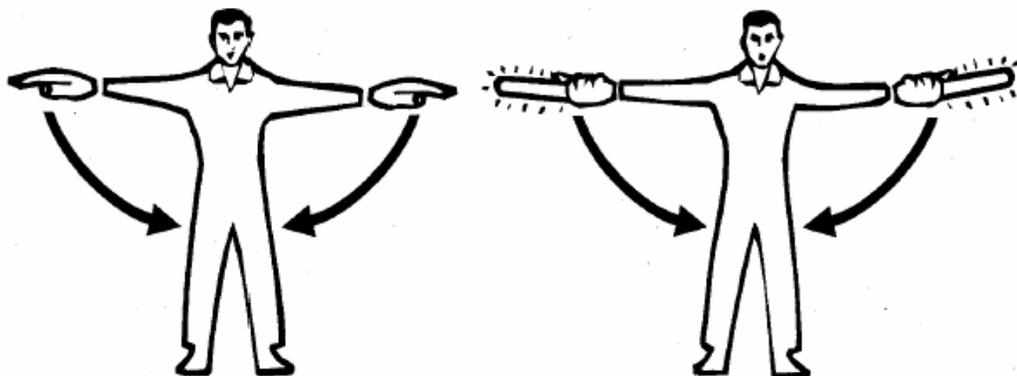
17. VERTICAL MOVEMENT -- MOVE UPWARD

Arms extended horizontally sideways beckoning upwards, with palms turned up. Speed of movement indicates rate of ascent.



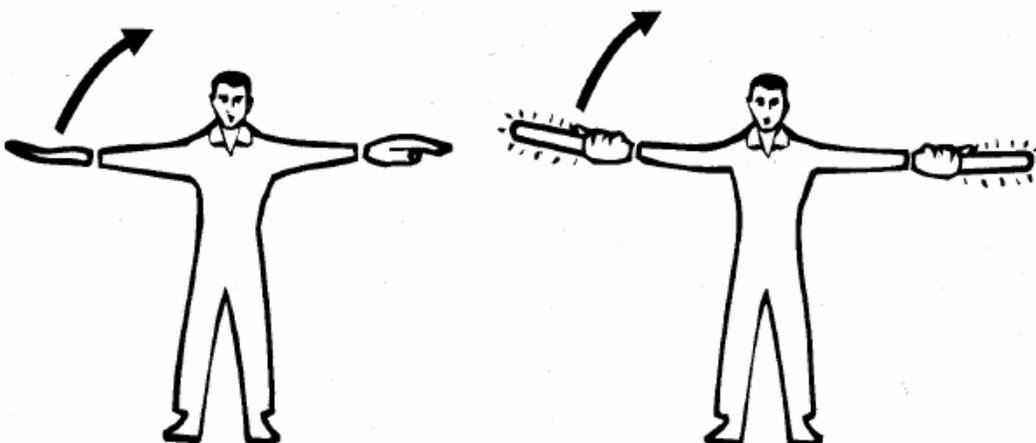
18. VERTICAL MOVEMENT -- MOVE DOWNWARD

Arms extended horizontally sideways beckoning downwards with palms turned down. Speed of movement indicates rate of descent.



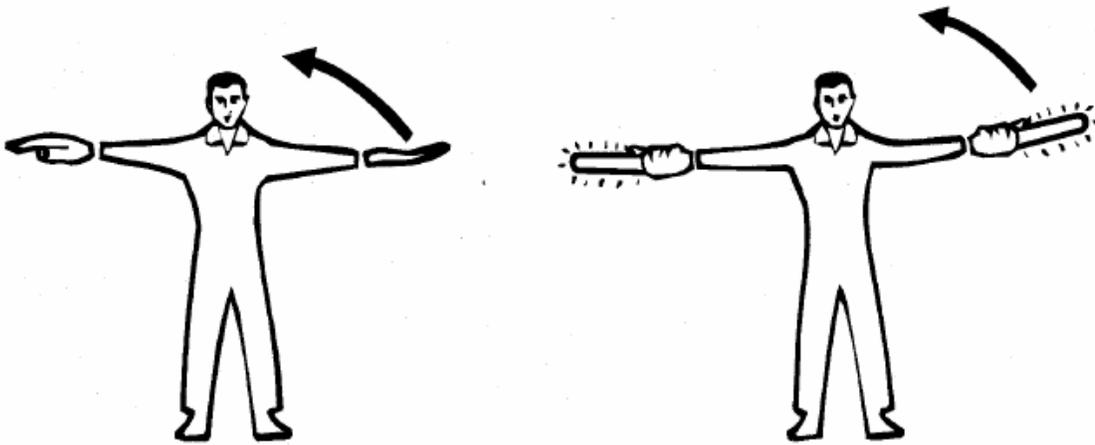
19. HORIZONTAL MOVEMENT -- MOVE TO THE RIGHT

Left arm extended horizontally sideways in direction of movement and other arm swung over the head in same direction, in a repeating movement.



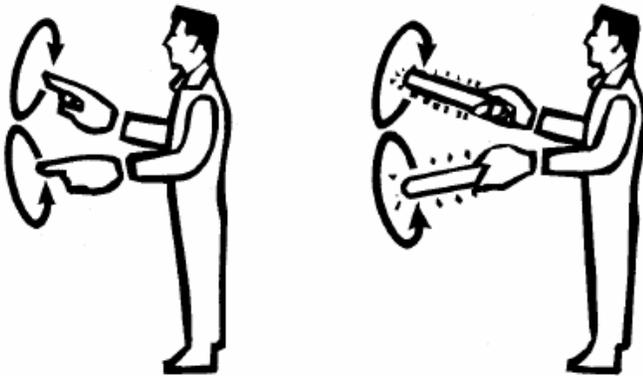
20. HORIZONTAL MOVEMENT -- MOVE TO THE LEFT

Right arm extended horizontally sideways in direction of movement and other arm swung over the head in the same direction, in repeating movement.



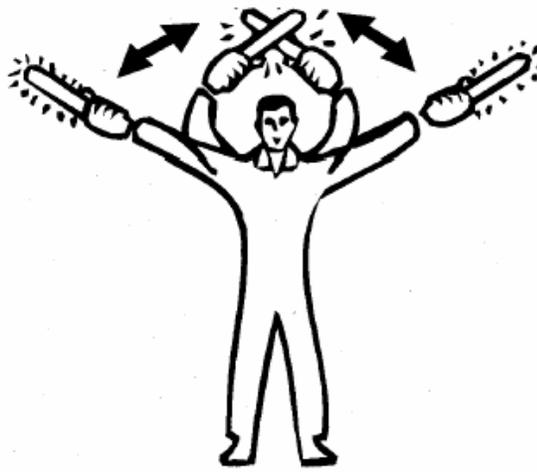
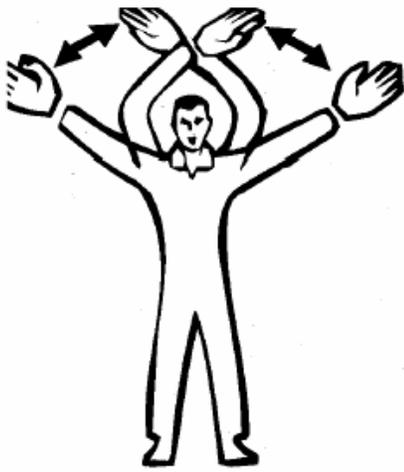
21. LOWER WHEELS

When aircraft approaches with landing gear retracted, marshaller gives signal by side view of a cranking circular motion of the hands.



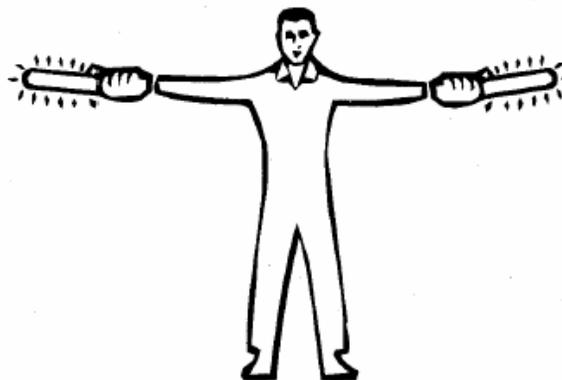
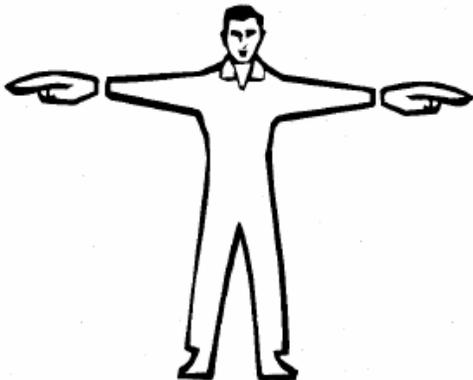
22. Wave Off

Waving of arms over the head.



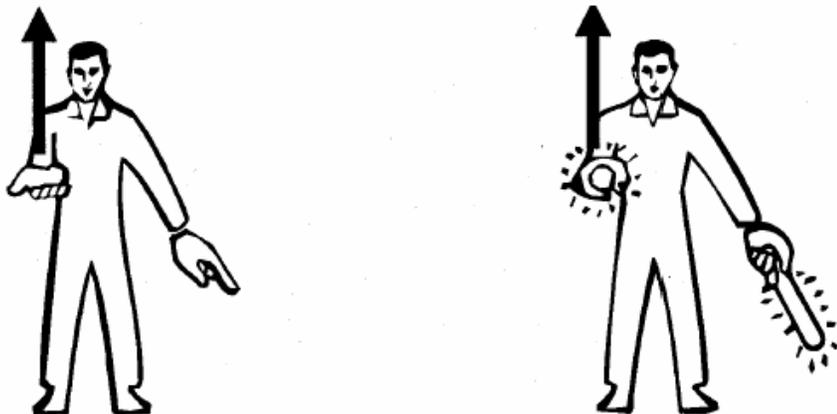
23. HOVER

Arms extended horizontally, palms downward.



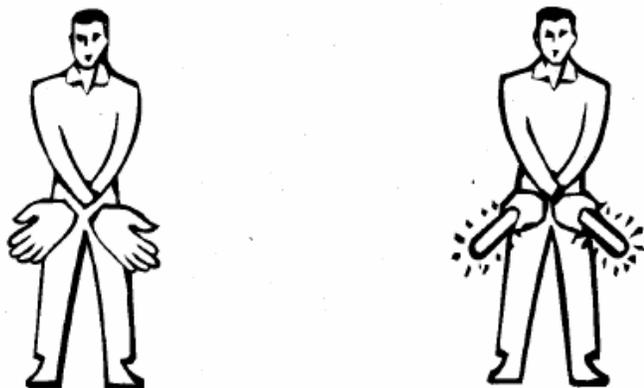
24. SPOT TURN

Left or right hand moving upward and backward, from a horizontal position, to indicate direction of tail movement. Other hand pointing to center of spot turns. Marshaler must remain in full eye-view with pilot.



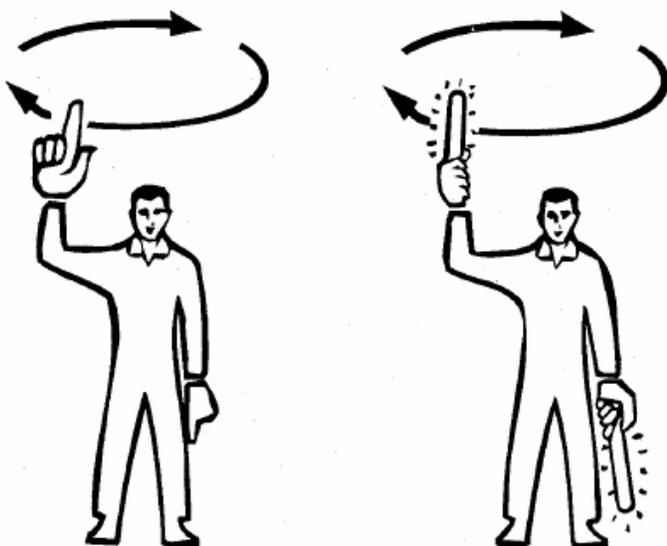
25. LAND

Arms crossed and extended downwards in front of the body.



26. ENGAGE ROTOR(S)

Circular motion in horizontal plane with right hand above head.



27. TAKE OFF THIS WAY (at pilot's discretion)

Marshaller conceals left hand and makes circular motion of right hand over head in horizontal plane ending in a throwing motion of arm towards direction of takeoff.

