Chapter Five - Search Techniques and Operations (Land)

5.01. Police authorities undertake the responsibility for coordination of land search and rescue.

5.02. The previous chapter described how to determine the area where available search efforts should be deployed. Once this area has been determined, a systematic search for the target should be planned. Prior to a search operation commencing, the search planner should provide a detailed search action plan to all involved, specifying when, where and how individual search assets are to conduct their operations. Coordination instructions, communications frequency assignments, reporting requirements, and any other details required for the safe, efficient and effective conduct of the search must also be included in the search action plan.

5.03. The selection by the SMC of available SAR units to be used in SAR operations should take into account the following considerations:
   a. the need to reach the distress scene quickly; and
   b. suitability for at least one of the following operations:
      i. provision of assistance to prevent or lessen the severity of accidents;
      ii. conduct of a search, primarily by air but with the assistance of marine or land units as required;
      iii. carriage of supplies to the scene of an accident and, if necessary, delivery of supplies; or
      iv. execution of a rescue, (by marine and land units or by helicopters; and as required fixed wing aircraft to provide guidance to units or to relay communications).

5.04. In coordinating a land search, the SMC, as guided by local procedures, will activate land, marine or air assets depending upon the situation. JRCC can assist with advice on suitable aircraft for SAR operations.

5.05. **Land Assets:** The SES or equivalent in each State or Territory will provide trained and disciplined teams of volunteer search personnel. The training will vary depending on:
   a. the location of the SES Unit,
   b. type of terrain likely to be encountered by members of that unit (ie Victorian SES would have a snow capability while western Queensland and Western Australian Units would have a desert capability),
   c. number of staff available for training
   d. support provided by individual State and local governments, and
   e. necessity of the units for SAR incidents.

5.06. With respect to SAR, SES members are trained in the following:
   a. basic land search techniques,
   b. Radio operation
   c. Log taking
   d. First aid
   e. Crime or suspicious scene preservation
   f. Vertical rescue
   g. Logistics
   h. Planning
   i. Flood boat operations

5.07. Search by land facilities alone is usually impractical for large search areas but it can be conducted in most weather conditions and can provide complete coverage of a confined area.
that cannot be thoroughly searched from the air. Land parties are also critical in operations where the search is carried out from the air and rescue by land facilities.

5.08. The need for coordination between land rescue units and search aircraft should be considered, and plans should cater for the need for two-way radio communication. There may also be a need in remote areas to keep land units supplied with fuel, water and food by means of airdrops.

5.09. When the survivors are located, the SMC should liaise with the police commander with a view to expediting the return of survivors to a place of safety. Consideration should be given to aircraft relay and the use of suitable motor transport: ambulances, four-wheel drive vehicles, buses, etc.

5.10. Specialist police and military land parties are equipped with material useful to the SAR role. It is desirable that land SAR units be equipped with basic navigation aids, two-way communication equipment, sufficient clothing, medical supplies and rations to reduce the need for air drops and specialist equipment appropriate to the unit’s particular role.

5.11. **Marine Assets:** The water component of a land SAR incident might involve inland waterways, lakes, dams and coastal areas of the country.

5.12. While most of the land SAR marine environment will be smooth water there are areas in Australia that have fast flowing white water, such as north Queensland and Tasmania. The SES in most states have a flood boat capability which is also available as a SAR asset. Flood boats are of shallow draft and made of metal to resist floating debris. They are capable of getting close into the banks of creeks, rivers dams and other water areas to search sections not easily visible from the land side.

5.13. White water rapids will require a different approach as they are not easily navigated by the larger flood boats. Searching from smaller man powered craft or from landward may be necessary.

5.14. As with aircraft, the discretion to use the boat is in the hands of the skipper. Being of shallow draft and low freeboard they are not suitable for rough conditions or surf.

5.15. Local Surf Lifesaving Units may have a capability to assist in searches in or near the shoreline of beaches. In the more populated or tourist areas the Surf Life Saving Association will have water craft, suitable operators and a wealth of local knowledge.

5.16. **Air Assets:** Many types of aircraft will be suitable as SAR Units with little or no modification. However, care should be taken to ensure that, even in an emergency, safety of flight is the primary consideration and should never be compromised. The normal operational and technical limitations of an aircraft, as well as the qualifications of the crew, should be carefully noted by the SMC. SMC’s must ensure they are cognisant of the factors relating to the aircraft and crew that may compromise the conduct of the SAR mission.

5.17. Some specialist SRU’s that have undergone training from JRCC are organised in Tiers and can be fixed wing aircraft or helicopters. The tiers relate to the capabilities and training of the aircraft and crews. When chartering aircraft for use as SAR Units, the SMC shall, whenever practical and effective, select aircraft from trained SAR/Emergency operators including:
   a. Search and Rescue Units (SRU’s);
   b. Police and State Emergency Service aircraft.

5.19. Advice on suitable aircraft can be obtained from JRCC

5.20. If additional aircraft are required, call out could be made according to the following priority bearing in mind suitability, location and availability:
a. domestic commercial aircraft,
b. Coastwatch aircraft
c. ADF aircraft
d. scheduled Regular Public Transport (RPT) aircraft.
e. private aircraft

5.21. Private aircraft may be used when so situated as to more readily effect the saving of life, operated by crew having particularly valuable local knowledge of the area to be searched, or when no other commercial aircraft are available.

5.22. As a general rule, slow aircraft or aircraft capable of reducing speed to 100 - 150 knots are most efficient for visual searches. Small and partially hidden targets are easily missed at higher speeds and faster aircraft may be subject to operational limitations making them unsuitable for low-level flights. Nevertheless, fast and/or highflying aircraft also play an important role in search operations, for instance when these aircraft carry out:
a. an electronic (radio) search to home on distress signals; and
b. an exploratory sweep of a large search area simultaneously with a search by a slower aircraft flying at lowers levels, a method that is particularly effective in flat and unobstructed areas.

5.23. The suitability and efficiency of an aircraft for search, support and rescue operations will depend on which and how many of the following desirable features it possesses:

a. Operational characteristics:
i. safe low-speed and low-level flight capability,
ii. short take-off and landing (STOL) capability,
iii. sufficient range to cover the area, with due regard to the location of redeployment bases,
iv. manoeuvrability, especially for searches in mountainous areas, and
v. payload capacity;
b. Equipment:
i. suitable navigation and instrument flying aids,
ii. radio equipment capable or receiving and homing on emergency radio signals, and
iii. adequate communications equipment;
c. availability of good observation posts;
d. suitability for the delivery of supplies, emergency equipment and personnel; and
e. facilities for the treatment and carriage of survivors.

5.24. The SMC shall select aircraft for use as SAR Units after consideration of the following factors:

a. type of search necessary;
b. type of terrain;
c. type of navigation involved;
d. need for dropping supplies;
e. disposition of aircraft with respect to search area;
f. crew experience and familiarity with the area;
g. weather conditions at and en route to search area; and
h. rescue considerations.

5.25. Aircraft not equipped with radios should not be used on SAR operations except as a last resort.

5.26. Fast, high flying aircraft equipped with homing and/or direction-finding equipment that have the operational flexibility to descend to low level for final search are recommended for beacon monitoring.

5.27. Seaplanes and amphibians are useful for search or for carrying supplies and personnel over water. Their use as rescue units or carriers of personnel is limited to operations in lakes and river areas, or sheltered waters and bays. Under favourable weather and sea conditions,
suitable seaplanes may also be used for rescue operations in protected waters, eg. large lakes, bays, shore areas etc.

5.28. Helicopters are particularly useful SAR units as their slow speed and ability to hover make them suitable for search as well as rescue operations, particularly where small targets are sought or close scrutiny of terrain is required. They also have the ability to land in a confined area and, in some instances, to operate from some vessels.

5.29. Some helicopters are fitted with winches or are equipped for flight in instrument meteorological conditions (IMC) and at night giving them an added advantage for search and rescue response. Turbulence, gusting winds and icing are conditions that the SMC should consider when determining helicopters as appropriate SAR units.

5.30. Where terrain and vegetation is such that a contour search is necessary, preference should be given to:
   a. helicopters,
   b. high-performance short take off and landing (STOL) aircraft, or
   c. light, manoeuvrable twin engine aircraft.

5.31. Where possible, single engine aircraft should be restricted to areas where the terrain would permit forced landings.

5.32. When possible, consideration should be given to engaging aircraft capable of carrying at least two Observers.

5.33. Where possible, landing sites should be as close to the search area as possible. The landing area selected should be clear of loose articles that may be blown into the air by the rotor downwash. On beaches, it is best to use the water’s edge to form one side of the landing area. Communications should be established with the aircraft before its arrival and the pilot briefed on the landing site. If the pilot is unfamiliar with the location, a description of the area using large geographical features may need to be passed. If possible, a number of people should be deployed to secure the area before the aircraft arrives so that no one enters the landing area until the rotors of the aircraft have stopped or the pilot indicates that it is safe to do so. If the landing area is in a populated area, extreme care should be taken to ensure that no children run toward the aircraft once it has landed. When communicating with the aircraft it is important to inform the pilot of any obstacles in the immediate area. This is especially applicable to wire strung between trees and power lines as these types of obstacles are difficult to see from the air and present a danger to the safe operation of the aircraft.

5.34. **Search Planning:** At a minimum, developing a search action plan consists of the following steps:
   a. selecting search assets and equipment to be used.
   b. assessing search conditions
   c. selecting search patterns to cover the search area as closely as practicable
   d. dividing the search area into appropriate sub-areas for assignment to individual search teams; and
   e. planning on-scene coordination

Note: While marine search areas are calculated from well established tables, land search areas will be a combination of theoretical, statistical, subjective and deductive reasoning.

5.35. Before committing resources to an intensive search, an evaluation should be made of the total search effort required and the contribution that may reasonably be expected from each search unit. When assessing available search capacity, care must be taken not to overestimate either the time that a particular search team can spend in a search area or the capability of that team to remain effective over long periods of continuous searching.

5.36. Failure to make a sound estimation of these factors may result in one or more of the search teams being unable to complete its allocated task and the efficiency of the entire effort being seriously compromised.
5.37. **Land SAR Strategies**: Although specific search plans will vary with the circumstances, a system has evolved which can apply to most situations. Land searching may be divided into four strategies:

a. Fast Search  
b. Reconnaissance Search  
c. General Search  
d. Contact Search

5.38. In land search it is not necessarily go through the strategies in order, the SMC has to apply the most appropriate search strategy in order to maximize the POD.

5.39. Therefore, in the initial time of a search the SMC may employ a Fast strategy, as later resources arrive, a Reconnaissance strategy may be employed. As time goes by and a person approaches their TFFS and/ or the search area expands for whatever reason, the SMC may employ a General Strategy in a high probability search segment, other teams for further Reconnaissance or Fast strategies in other segments. The fact is, all strategies can be used at the same time in different search segments. **It is a Strategy that is applied to the search, NOT a stage that the search goes through.**

5.40. Often a search will progress from one predominant strategy to another. However, depending on urgency, TFFS and resources, etc, varying strategies may be employed simultaneously in differing search segments.

5.41. With each of the four strategies there are associated search patterns that utilise the resources available to the best effect. Further details are provided in the search pattern section.

5.42. Approximately 70-80% of missing persons are located using the fast and reconnaissance strategies, therefore these two strategies should be the first considerations of the SMC when planning for a SAR.

5.43. **Immediate Response**: The initial search will normally consist of:

a. A visual search along, and also parallel to, the track of the missing target. (A fast or reconnaissance search)  
b. Actions to determine whether a signal from an emergency beacon has been detected.  
c. Formulation of a rescue plan  
d. Coordination with other resources and agencies as appropriate.

5.44. The search may comprise:

a. Developing a search area utilising a combination of theoretical, statistical, subjective and deductive reasoning  
b. Developing sub-search areas  
c. Allocating search teams  
d. Searches utilising any one or a combination of the below search patterns.  
e. Developing a rescue plan to return survivors to safety.  
f. Gathering intelligence relevant to the search

5.45. The SMC should consider:

a. Utilising the media if appropriate  
b. Tasking local resources where the urgency of the situation dictates.  
c. That a search and/or rescue may be required.  
d. The terrain, vegetation, weather, intentions of missing persons, ability of the search teams, search light available and resources available.  
e. That the coverage factor should generally not be less than 0.5; and
f. The use of electronic or thermal imagery equipment.

5.46. **Fast Search**: This method is best used when the search team arrives at the scene not long after the target has been reported missing. There is an assumption that teams are looking for a responsive target. This search provides an immediate SAR effort and requires minimal search planning to commence.

5.47. **Fast Search techniques**: Teams are briefed to check the LKP and tracks or route intended by the target. This is normally done by lightly burdened teams of faster searchers. Track running, with regular stops for aural searching, is the standard technique. Checks of perimeters or barriers, roads, track cutting, ridge running and obvious hazards or attractions can also be incorporated.

5.48. **Fast Search considerations**: Teams used in this type should have some experience in clue and track detection and bush awareness. While there is a high percentage change that this type of search will locate a missing target it will also assist in defining the search area and providing information to the SMC of areas that need not be searched.

5.49. **Reconnaissance Search**: The main reason for the reconnaissance is to carry out a quick check of specific area of probability, and also to obtain essential information about the search area, both of which have a bearing on the future search plan. Reconnaissance teams may also find the missing person or object. A reconnaissance search can be conducted using ground teams, vehicles or aircraft. A reconnaissance can be used, not only early in a search, but at any time to check on unconfirmed sightings or to re-check specific areas of probability.

5.50. **Reconnaissance Search, Containment**: In any search, containment should be effected by cordoning the area where possible. This may through identifying physical barriers around the search area, regular patrols of roadways or tracks or the placing of physical barriers such as ropes, bon fires or vehicles across likely exit points from the search area.

5.51. **Composition of reconnaissance teams**: Since they must travel light and fast, these teams should be kept small; ideally four persons. It is desirable that the leader or at least one member of the team have a good local knowledge of the task area and that all members are fit and capable.

5.52. **Task of reconnaissance teams**: The area to be covered by these teams will concentrate on the area of highest probability. This area may be further limited by the existence of natural barriers such as large rivers, cliffs, etc.

5.53. Orders given to the reconnaissance team may include the following:
   a. Check of all hazards which may have trapped or caused injury to the missing persons such as waterfalls, cliffs and caves.
   b. Check tracks, huts, routes, sand-bars, waterways, waterholes, waterfalls and other likely areas for clues such as footprints, discarded items of clothing and equipment, food scrapes or wrappings.
   c. At regular intervals call out to a missing person and listen for a reply. When vehicles are employed, the vehicle should be stopped and the engine turned off.
   d. Interview any person found in the search area and brief them on the situation. Record their names, addresses, car registrations and other details.
   e. Notify the Field Search Headquarters of any clue found. Do not disturb the clues, mark off the area as well as recording the time found and the name of the finder.

5.54. **Reconnaissance Team Briefing**: The reconnaissance team must be supplied with as much relevant information as possible about the missing person. Details of clothing, footwear,
equipment or items carried, all of which if discarded by the missing person, could provide vital clues. Often the importance of clues is only realised long after they have been dismissed as irrelevant.

5.55. **General Search:** When the SMC is able to define a search area, a decision may be made to cover the area with a general search. This is a general search of the area and may be used: 
   a. early in a search operation where there is a high degree of urgency; and 
   b. to reduce the search area in those situations where the search area is large.

5.56. **Composition of teams for general search:** Teams should be kept small (4 to 6 persons) and as far as possible comprise persons of equal fitness and ability. Larger teams can be utilised depending on the terrain.

5.57. **General Search Method:** Having determined search areas, the method of searching a particular area must then be decided. The term ‘general search’ does not imply an examination of every square metre, but rather a check for signs or indications of the missing person.

5.58. A check of campsites and other sheltered areas, such as hollow logs or caves, may produce results. A more detailed check of any natural hazards or areas where the missing person could be trapped or injured, should be made.

5.59. For areas of high probability, a modified form of general search may be employed using the same strength in the teams, but designating smaller task areas, resulting in a closer coverage of the areas involved. As for the reconnaissance search, the team should call out to a missing person at regular intervals and listen for a reply. This may need to be considered against the lost person behaviour.

5.60. **Contact Search:** The contact or line search can be used to saturate an area of high probability, although it is usually the concluding stage of a search operation. A contact search involves searchers moving in a straight line through the area, evenly spaced and in sight of the adjacent searchers. The spacing will depend on the density of the vegetation and the size of the target.

5.61. **Composition of Contact Search teams:** There is a practical limit on the size of a contact search team under the control of a single leader. This varies with conditions, but is normally 8 to 12 persons. The most experienced searchers should be at the ends and the centre of the search line.

5.62. **Tasks of Contact Search teams:** The contact search team must search every possible refuge, since a missing person suffering in the bush is unlikely to remain in the open but will rather seek refuge in a sheltered place, out of the wind, wet or extreme heat. These will include ditches, hollow logs, amongst large rocks and under small ground scrub. All areas must be searched.

5.63. **Contact Search, Special Considerations:** Searchers must look on both sides of obstacles and must continually look back as it is possible to completely by-pass an unconscious person lying behind an obstacle. A high degree of concentration is required in contact searchers, so the team leader should ensure that the searchers do not talk excessively or let their concentration lapse.

5.64. The contact search line must be kept straight. This is very difficult because different sections of the line will encounter varying obstacles, eg thick scrub. Some control must operate to ensure that faster searchers in clearer areas slow down and wait for those encountering difficulties. The best method is for the Team leader to be positioned in the centre of the
search line, preferably to the rear and call instructions to the flanks. An area can be covered more effectively by a series of short sweeps, rather than a single long sweep.

5.65. Spacing of the line is maintained from whichever flank is following the boundary or otherwise defined track. The other flank indicates their progress by using markers. It can be an advantage to use different coloured markers on each day of the search. At the end of each sweep, the markers become a guide for the next sweep. Markers should be placed in such a manner that they can be seen easily when returning in the opposite direction. Consideration should be given to using biodegradable marker material, such as toilet or tissue paper so that it will disintegrate shortly after a search if it is not retrieved.

5.66. The contact search is continued sweep by sweep until the area is covered. This is exhausting, time consuming and requires large numbers of searchers. It is important that search teams, operating in the same area, maintain contact to ensure that mutual boundaries are properly searched.

5.67. **Calculated Search Area**: This is a continuation of the immediate response, where the search area is expanded to cover the probability area calculated by reference to the targets location, targets intentions, estimated speed over the terrain, search area boundaries and hazards, and the target’s medical, physical and mental condition, modified by ongoing intelligence gathering. This area may increase or decrease as further information comes to hand, which will incrementally increase the POD over the centre of the search area.

5.68. The SMC should consider:
   a. the availability of search aircraft
   b. the availability of suitable ground assets
   c. logistical support for search teams
   d. location of Field Headquarters
   e. local weather conditions and expected forecasts.
   f. Continual intelligence gathering

5.69. **Search Area Coverage**: Once the search area has been determined, systematic search for the target should be planned. Factors such as the weather conditions, time available for the search, search assets available, size and dress of target, etc, should be taken into account. These factors are related but some are more important than others. In planning a search operation, the SMC should endeavour to meet the requirements of the more important factors while satisfying the requirements of the others as far as practicable.

5.70. Search area coverage is the systematic search of a selected parcel of land to ensure the optimum probability of detecting the object being sought. The factors affecting detection capability have been reduced to four inter-related expressions. The terms and their symbols are:
   a. Area Swept (W)
   b. Probability of Detection (POD)
   c. Track Spacing (S)
   d. Coverage Factor (C)

5.71. The number of searchers and search teams will be a factor in determining search area coverage. More time will be required to search a large area thoroughly when there are limited numbers of search assets unless the distance between searchers and search teams is increased. This is not desirable since it would reduce the probability of detecting the target. It may, therefore, be necessary to seek additional assets, either land or air, from other sources.
It is usually preferable to cover a search area from the beginning with an adequate number of search assets.

5.72. When search assets are operating far from the Field Headquarters, consideration should be given to them being redeployed to an advance base so that more time will be available for the search and less time will be spent travelling to and from the search area.

5.73. **Target Type:** The sweep width will depend on the type, size, colour and shape of the target, its colour contrast with the surrounding medium and whether or not the target is moving and responsive. Targets may vary from small children missing alone to a group of persons. It may also include a person in an inland waterway. All targets should be sought from a direction in which they receive the best illumination, colour brightness or contrast. This will normally be with the sun behind the searcher.

5.74. **Meteorological Visibility:** If visibility conditions are poor, a reduction in sweep width will be necessary, with the subsequent reduction in POD. Other weather conditions that may affect a search effort include:
   a. Fog, snow, and rain will make visual searching difficult and will require very close spacing between searchers.
   b. Smog and haze may reduce the effectiveness of night signals;
   c. Low clouds may reduce the amount of contrast between the target and the surrounding medium;
   d. Precipitation reduces visibility; and
   e. Terrain and vegetation in the search area.

5.75. **Type of terrain/conditions:** The type of terrain to be searched obviously affects the ease with which the search target will be detected. The more level the terrain the more effective will be the search. Not only can the searchers maintain a constant distance apart, there is less likelihood that undulations or irregularities on the terrain surface will hide the target. Thus flat deserts are easier to search than rolling hills, while rugged mountain areas are the most difficult. The more trees, vegetation, rock outcroppings and other surface irregularities that exist on land, the more difficult will be the search.

5.76. Open flat areas with little vegetation produce fewer shadows to confuse the searcher while dense forests have a multitude of shadows that can cause confusion to searchers. It is necessary for all searchers to be aware of the prevailing conditions and to modify their search techniques appropriately. The use of all six visual signals; silhouette, shine, movement, shape, spacing and shadow; when searching will provide the greatest chance of success.

5.77. **Search speed:** The speed of all land searching will be dependent upon the slowest team member, but in some instances a slower speed will benefit target location, particularly in denser vegetation or in areas with a large amount of ground cover. A slower speed will enable team members to stop and search to their rear at regular intervals, thus looking behind ground objects.

5.78. The effectiveness of a search team depends on the number of searchers available, their experience, alertness, physical condition, incentive and the suitability of the search pattern. The speed at which they search also has a direct relationship to the effectiveness of the team’s overall performance.

5.79. If feedback from the search teams indicates that searchers were excessively fatigued, it may be prudent to use a correction figure for fatigue and reduce the sweep width by 10 percent in any POD calculations. In the interests of Workplace health and safety if a team reported
excessive fatigue the SMC should be considering removing them from the field and resting them.

5.80. **Cloud cover and sun light:** The greater the amount of cloud cover, the less will be the ambient light in the search area. In a land situation this will reduce the amount of light with which to locate the target. In open areas with little vegetation the effects will be small, but in denser rain forests the effects may be to reduce the available search times dramatically.

5.81. Objects are seen at a greater distance when looking down-sun as opposed to up-sun particularly in early morning or late afternoon. With a clear sky and a bright sun, search conditions are at an optimum between mid-morning and mid-afternoon when the sun is high. Bright sunlight is especially detrimental when haze is present, due to the diffusion of light. Colour contrast is lost when looking up sun, with the result that small objects merge into a confused pattern of glaring light and shadow. Down-sun the glare is absent, haze is more transparent, and coloured objects show a marked contrast to their background.

5.82. **First and last search light:** The 45-minute periods after sunrise and before sunset are considered unsuitable for daylight visual searching on account of the sun's low elevation and resulting lengthy shadows.

5.83. These periods are therefore commonly discounted for visual searching at the planning stage, but may be used to move teams to and from their search areas, maximising the time available on scene. There may be other factors arising that impact upon search planning thus indicating the relative suitability of visual search during some or all of these periods.

5.84. Within proximity of the equator, where the apparent movement of the sun is at a greater angle to the earth's horizon and its rising and setting phases more rapid, these periods are less critical.

5.85. Examples of local factors that may need to be considered in the context of available search light are:
   a. A search within a tropical rain forest may best be started at dawn in consideration of a likely deterioration in local weather conditions later in the day.
   b. A search of the western slopes of steep sided valleys may best be delayed until mid-morning.
   c. A search of steep eastern slopes may best be abandoned earlier than 45 minutes before sunset.
   d. The search of desert areas may be suspended during the middle of the day as the sun will bleach out the environment and create mirages which will limit the effectiveness of any search.

5.86. Time available to aircraft outside the periods suitable for visual search may be utilised in other ways, for example, beacon search, radar search or FLIR search.

5.87. Searches begun early in the day, or extending late in the day have a reduced chance of success in wooded terrain due to the shadows cast by the trees and the oblique angle of the sun. These areas are preferably searched when the sun is higher in the sky. Likewise because of the sun, mountainsides may be better searched in the early or late in the day depending on the direction the particular slope faces.

5.88. Unlike marine SAR there are no tables developed for land SAR. The sweep width used in a land SAR will be entirely dependent upon the vegetation and terrain being searched. The search horizon is the distance from the searcher where the chances of locating the target are zero. In open vegetation this distance can be considerable, while in a rain forest it may only be a few metres.

5.89. **Visual Horizon:** In order to determine how far apart each searcher should be it is necessary to measure the search horizon for a particular vegetation type. This can be estimated from
previous experience in this type of vegetation or can be determined through a more scientific method.

5.90. Place an object of similar size and colour to the search target in the vegetation. Starting at the target searchers will walk into the vegetation until a point is reached when the target is not visible. Repeating this from several directions an average can be made of the distance measurements. This then becomes the search horizon for that particular vegetation. The searchers are then placed that distance from each other. This is the equivalent to sweep width in a marine world. The sweep width for an individual searcher will be the search horizon, spread evenly each side of the searcher.
5.91. **Area Swept**: The Area Swept (W) is the total combined sweep width of all searchers in a team multiplied by the distance searched; the area searched by the entire team. Eg. If there are 10 searchers with a search horizon of 10 metres (0.01km) who have searched a distance of 2km then the total W for that team is 10 searchers x 0.01km x 2km = 0.2km². All measurements should be in kilometres for the calculations to work. More in Appendix I.

5.92. The zero detectability area of one searcher will meet that of the next searcher. The Bell Curve indicates that the probability of locating a target outside the sweep width is equal to the probability of missing a target within the sweep width. Aside from these calculations, the standard rule of thumb is that searchers should be able to see the ankles of the searcher next to them. This ensures that the area between searchers is search twice, once by each searcher.

![Search Bell Curve](image1.png)

The number of missed detections (B) inside the effective area swept equals the number of detections (A) that occur outside the area swept.

**Search Bell Curve.**

5.93. **Accuracy of navigation by Search teams**: The navigational accuracy with which a search team is able to reach a search area and then execute the search pattern has an important bearing on the coverage of the area and the POD. Dead reckoning navigation alone generally produces poor results. Map reading can be effective with the assistance of visual markers such as mountains, rivers and man-made objects, but is very dependent on having good meteorological conditions. In areas where navigation aids are limited, search patterns should be selected so that greatest possible use is made of them. The use of electronic navigation aids is becoming increasingly prevalent and while a valuable tool, the basics of old fashioned map reading cannot be eliminated.

5.94. **Night Searching**: Before deciding to search at night, there is a need to assess the urgency as well as the possibility of success against the risk to search team members. Night searching is not a task for inexperienced searchers. Some advantages and disadvantages are listed below:

a. **Advantages of Night Searching**
   i. Tracks and signs show up much better at night when illuminated by a torchlight. The torchlight forces the searcher to concentrate on the small field
of view given by the light beam. The concentration assists with the detection of small clues.

ii. Footprints and tracks are better preserved at night because they do not dry out as quickly and therefore maintain their shape and identity.

iii. In hot weather, night travel is much less strenuous than day-time travel.

iv. Human voices carry further at night.

v. Torchlight and fires can be seen by missing persons and can act as an attractant technique.

b. **Disadvantages of Night Searching**

i. Possible risk to searchers

ii. The missing person may be injured whilst attempting to move to, or away from searchers that are heard in the dark.

iii. The possible accidental destruction of vital clues.

iv. Missing vital clues

v. Use of lights destroys searcher’s night vision. On nights where there is a moon it is often beneficial to search without the use of torchlight. Given sufficient time for eyes to adjust it is surprising how much can be seen at night. Non use of a torch also allows eyes to be drawn to areas of colour difference which would otherwise have been missed outside the torch beam. The use of a red covering over the torch can provide a reasonable combination of light to see by but sufficient darkness to notice small details in the bush.

vi. Greater control problems for searchers.

vii. The natural fear of the dark may cause greater apprehension in the missing person and searchers. Do not disregard the fear of the dark. The searchers at the end of a line search conducted at night can be greatly affected by this fear, to the extent that they gradually move towards the centre of the line. Their concentration is also very limited although their imagination often becomes heightened.

5.95. Vehicle boundary patrols are recommended at night and should utilise calling and listening techniques. A high point lookout or aircraft should also be considered.

5.96. **Search Patterns:** The selection of a search pattern is very important and should only be made after all factors have been considered. The search pattern selected should meet the following criteria:

a. **Suitability:** It should permit the search to be completed within the time limits;

b. **Feasibility:** It should be within the operational capability of the available search units;

c. **Acceptability:** The expected result should be worth the estimated time and effort.

5.97. **Safety of the search units:** Land search teams will not normally sustain injuries or damage if they run into each other, but the SMC must be aware of the terrain and any known or potential hazards that may make endanger the searchers. Where possible only those teams capable of negotiating the hazards should be used in those areas. Eg. Only teams experienced in vertical rescue should attempt searching cliff lines. Other hazards may include wildlife, bush fires, storms, loose or rocky ground, hidden caves or mines. These hazards should form part of the team briefing prior to commencing a search.

5.98. If using vehicles, motor cycles, quad bikes or other motorised units, specific attention needs to be paid to the disposition of units within search areas. All vehicles should have their head
lights on, regardless of the time of day. They should also carry, on their front bumpers, flags or pennants on flexible poles that exceed the height of the vehicles to warn other vehicle whilst negotiating crests. If flashing warning lights are fitted, they should also be activated. A team leader should be assigned to coordinate vehicle searching.

5.99. It is common to utilise aircraft, both fixed and rotary wing, in land searches. A single aircraft assigned to a single search area can easily be coordinated. Multiple aircraft searching multiple areas can become a nightmare. Civil Aviation Regulations specify separation and height distances for aircraft. It is recommended that the aviation section of JRCC be contacted to assist in the coordination of air searches involving multiple aerial assets. This will relieve the SMC of the necessity of developing search areas, spacings, heights and briefings. JRCC will seek what areas need to be searched and all other relevant information and then develop suitable plans, including the issue of appropriate NOTAM’s. These plans will be forwarded to the SMC for approval prior to being implemented. EMD will brief each individual aircraft and collate the subsequent results. Overall coordination of the land search will remain with the SMC.

5.100. **Searching in hazardous areas:** Many different types of man made hazardous areas will be encountered by search teams in a wide variety of environments. Country or rural searching will necessitate searchers entering sheds, barns, machinery spaces during a search. Prior to entry the SMC should ascertain as much information as possible about the potential hazards to searchers. Information may include poisonous chemicals that should not be touched without gloves, potential breathing hazards that require face masks. Other dangers may include unprotected machines such as water pumps, grain augers, air compressors, all of which can cause severe injuries if clothing or limbs become trapped.

5.101. Grain silos, feed bins and other containers that store large amounts of produce can be particularly dangerous and should only be searched by those who have operational experience with them.

5.102. Within an urban environment building and construction sites present particular hazards to searchers. With the increasing occurrence of dementia/Alzheimer sufferers wandering from their homes it is often necessary to search these sites. Search team leaders should always approach the site foreman before entering onto a building or construction site. The foreman can then assign a person to guide the searchers around the site and provide advice about dangerous areas such as crane operating areas, concrete pouring sites, welding and cutting areas, compressor and electrical areas. On the larger construction site it may be necessary for searchers to undertake a quick orientation or induction to that work site. It may also be a requirement that all searchers wear hard hats whilst on the work site. While these sites need to be searched if they are within the search area unnecessary risks are not to be taken by searchers.

5.103. If the search is being conducted at night or over the weekend/public holiday it will be necessary for the SMC to locate a site foreman prior to any searchers entering those particular areas.

5.104. **Search Patterns:** The choice of search pattern is the prerogative of the SMC, who may elect to use only one pattern or several patterns simultaneously but in different areas. A series of search patterns may be used in sequence for the same area, e.g. indian file, track sweep. The following factors will influence the SMC’s selection of search pattern:

- The accuracy of the LKP;
b. The size and shape of the search area;
c. The number and type of SRUs available;
d. On-scene weather;
e. The distance to the search area;
f. The availability of navigation aids in the search area;
g. The size and detectability of the search object;
h. The desired probability of detection;
i. The limitations of time; and
j. The terrain of the area where the search will be conducted.

5.105. In order to achieve the greatest efficiency from search teams, it is necessary that each team be deployed to ensure the maximum terrain is covered in a sweep and all members are actively employed. This particularly applies where team members are tired and may tend to follow the leader without attempting to search.

5.106. The SMC will determine the search pattern that is required to search a particular area. This will take into account the terrain to be searched, the target, number of searchers and capabilities of the search teams.

5.107. The Team Leaders will be responsible for implementing the search pattern of the SMC. The Team Leader will also be able to modify the SMC search plan if the situation on-scene changes or a more efficient pattern is available. The Team Leader will communicate these changes to the SMC.

5.108. The Team Leader will place individual members within the search pattern and allocate primary areas to be searched by each member. While on the move, the Leader must ensure members maintain their position within the pattern and remain alert.

5.109. **Global Positioning Systems (GPS):** The use of GPS for navigation has been increasing over the last decade as they have been reduced in both size and cost. GPS are to be considered as another tool in the SMC’s arsenal. While each search team should be able to navigate via a map and compass the issuing of a GPS to each team will provide a backup method of determining their exact location. When training, emphasis needs to be placed on gaining navigations skills using the older methods and not relying on GPS or other systems. The reasons for this are the bugbear for most modern technology, flat batteries. A GPS with a flat battery is no more than a paper weight. The GPS should be used as a method of confirmation rather than the primary navigation tool. Where they do come into their own is providing an exact recording of the search areas undertaken by that particular team. The search details can be down loaded onto a computer and overlaid on a map. This will indicate precisely to the SMC what areas were searched and what areas remain. This removes any doubt that a team leader may have in relation to their search. A GPS will assist when searching in featureless terrain or when natural boundaries are not available to define a search area. Spare batteries need to be carried by the search team. Although all GPS’s provide similar basic information there is such a variety of operating procedures that training needs to be model or brand specific. Where possible GPS’s of the same type should be carried by search teams in the same search, allowing for technical information to be passed from FHQ to teams easily.

5.110. **Common Search Patterns:** Common search patterns which may be used to suit varying terrain and circumstances include the following:

- a. Single File
- b. Track Sweep
- c. Point and Flank
- d. Purposeful Meandering
5.111. Indian File:

i. This pattern may be adopted when searching a foot track or narrow defile.

ii. The team travels along the track, one behind the other, searching the track and its immediate surrounds, paying particular attention to the member’s primary arc of search. Position 1 will search ahead on the track and to approximately 45° to both sides. Positions 2 and 3 will be searching each side of the track from 45° ahead to 45° behind. Position 4 or the rear member will be searching the track, but stopping every ten metres to check behind all obstacles. The Team Leader is not assigned a search sector but will check all areas as required.

iii. The Leader is positioned where best control of the team can be affected, usually towards the middle of the team.

iv. This search pattern can be used when searching for a person who is expected to be mobile.

5.112. Track Sweep:

i. Where terrain and vegetation permit, a more efficient pattern for searching a track may be a track sweep.

ii. In this pattern, the Leader is positioned on the track, with the team forming a line extending either side of the track. This allows for searching an area out to the full span of the team.

iii. The distance between team members will be greatly dependent on the thickness and type of terrain being searched. Refer to earlier section for more details on separation distances.
iv. This pattern can be used when the missing person is predicted to be mobile, but could also include persons who may sprain an ankle or fall injuring themselves. Missing persons have been known to sit or find shelter just off the edge of the track. Possessions, food wrappers and items of clothing may be discarded and tossed aside, landing a short distance from the track’s edge.

5.113. Point and Flank:
   i. A common approach to following a track is with a three person team. The three-person team, comprised of a point person and two flankers, has several advantages. This is a method commonly used by armies throughout the world to locate targets, enemy or otherwise.
   ii. This pattern allows for consultation in difficult situations because three heads are better than one. If a searcher can convince another searcher that they are seeing a sign, then the chances are that it is a sign that is being observed.
   iii. When training, this method builds confidence, reduces errors, and benefits searchers by allowing a verbal exchange of the details of what is being observed rather than just mutually looking at a clue or disturbance.
   iv. It allows for the rotation of the point person, who may be physically on their hands and knees on the ground searching for a sign. Point is a tiring position, especially when signs are limited.
   v. The team can split up at track junctions, with team members going down each track for a short distance. Any team member can call the team back together when they find a sign indicating the correct track.
   vi. This search pattern is not suitable in all terrain or conditions. Three member teams may not always fit in with the current team structures in some organisations.
5.114. Barrier:
   i. This type of search is set up between two search boundaries and is aimed at locating the missing person as they travel through a search area.
   ii. The boundaries need to of sufficient definition to funnel the missing person through, such as rivers or cliff lines.
   iii. The search team travels back and forth between the boundaries, keeping a lookout for the missing person.
   iv. This can be done with a small number of searchers or by vehicle if need be.

5.116. Purposeful Meandering:
   i. This type of search can be used in most circumstances when the search area is defined.
ii. The team is arranged in a line facing the direction of travel.

iii. Several members of the team have compasses and act as guides to the remainder of the team.

iv. The Team leader remains at the rear to provide overall supervision.

v. Each team member is free to wander or meander through the search area, to check out objects or sightings that catch their attention. Some objects may be better seen from the side and so escape the attention of a searcher coming from the front.

vi. Each searcher has a definite visual horizon, and as can be seen in the diagram there will be areas searched or scanned several times by different searchers and also that there will be areas that are not searched at all.

5.117. Square:

i. When searching on a restricted front such as a gorge, the square pattern may be adopted. This will gain the maximum advantage from a team which can not be extended to a full span.

ii. This pattern can also be adopted while conducting a Track Sweep Search when the terrain closes in on the ends of the search team. Rather than bunching up the team members they can for formed into this pattern.

iii. In this pattern, the Leader is positioned to best advantage, usually in the middle of the team. The members are placed in pairs to the front and the rear sides of the Leaders position.

iv. The two forward groups will search ahead and to 45° each side. The two rear groups will search from 45° each side to 45° to the rear.
5.118. Parallel Sweep (Single Team):

i. The parallel sweep pattern searches are used when the terrain and vegetation allow adequate control. This formation is normally used in contact searches when thorough coverage of the ground is required.

ii. It is used when the area to be covered can be done so in a single sweep.

iii. The simplest method of conducting a search is generally by the parallel sweep where a team will move through the search area paralleling a feature, such as a fence or road, or moving on a determined compass bearing.

iv. In this pattern, the members are positioned parallel to a start line with the Leader located at the rear middle of the team. Under the direction of the Leader, the team sweeps forward from the start line until the area has been completely searched.

v. Refer to section 5.89 for more details on determining the distance of separation between searchers.

vi. The speed of this search is governed by that of the slowest searcher. The Leader must ensure than all members proceed at the same pace, as this will ensure that there are no gaps left in the line and all areas are covered.

vii. This search should only be used in areas where the terrain is of the same type, therefore allowing all team members to search at a similar pace.
5.119. Parallel Sweep (Multiple Teams):

i. Where a large open area is to be searched, it is possible to use multiple teams in an extended line.

ii. When using multiple teams it is better to stagger the teams rather than combine all personnel into one large line.

iii. The terrain and vegetation for all search teams across the line should be of similar type, allowing for all searchers to proceed at a similar pace. If there are great disparities in terrain or vegetation type or thickness, consideration should be given to dividing the area into smaller areas of the same type.

v. In the example shown below the left hand team with the boundary on the left begins the sweep. The left hand member keeps the boundary while the right hand member marks the right hand edge of the line. After a suitable period of time, the second Team begins the advance, with the left hand member finding the marked boundary left by the previous team. The right hand member of the second team marks the right hand edge of the second team’s line. After a suitable period, the third team begins the advance, and so on. The search boundaries should be marked out with a biodegradable material such as toilet paper, used at regular intervals but close enough to be able to be easily seen by all searchers. The paper can be dyed for use on different days.

vi. If a team catches up to the team in front in the staggered formation, it will be necessary for that team to pause to enable the front team to advance further ahead. Do not allow the teams to combine into a single line as control is too difficult.

vii. The search line leader controls the movement of the teams through individual Team Leaders. 

viii. To assist in control, the search line leader will generally need to have available a radio operator to transmit instructions directly to the Team Leaders.

ix. The search line leader’s radio should be on a separate frequency to the search control net.
5.120 Creeping Line Ahead:

i. Where team strength does not permit the searching of an area in a single sweep, the area may be searched in a series of sweeps known as the creeping line ahead search formation.

ii. This method is particularly applicable in thick vegetation or rough terrain where control problems may preclude the use or employment of large teams.

iii. To conduct this search, a start line and search boundaries are determined.

iv. The team is placed in a parallel line along one of the boundaries, perpendicular to the line of advance.

v. The leader is positioned toward the middle and behind the team.

vi. The team members on the flanks are tasked with marking the limits of their search. The search boundaries should be marked out with a biodegradable material such as toilet paper, used at regular intervals but close enough to be able to be easily seen by all searchers. The paper can be dyed for use on different days.

vii. The team member acting as the marker will not be able to concentrate entirely on searching because of the distraction of tying the material to the tree. This needs to be allowed for in relation to the area covered and to the speed of advance.

viii. Before beginning, a number of strips of toilet paper can be prepared, assisting the marker in carrying out the task.

ix. The team searches the area from boundary to boundary in a series of sweeps, moving back and forth from the start line until the area has been searched.

x. When redeploying for a return sweep, it is essential that the team leader maintains control and ensures that the changeover is conducted as smoothly as possible.

xi. To ensure a smooth change, there are two suggested methods:

**Method One:**

a. The team on reaching the boundary halts and the member at the axis of advance (end of the line) marks the limit of search.
b. The team then turns in the direction required and moves one team span past the marked limit thus maintaining their original position within the search line.

c. The team then sweeps towards the opposite boundary.

Method Two:

a. On reaching the boundary marking the limit of search and turning in the direction of the axis of advance.

b. The member at the axis maintains position, the remainder of the team by-passes and forms up after one team span.

c. The team then sweeps towards the opposite boundary.

5.121. Contour:

i. It is rare that an entire hill or mountain will be searched in one go. It is more often that segments of slopes will need to be searched.

ii. When searching hills, ridges or spurs, it is advisable to commence searching from the high ground. This allows searchers to observe the ground from height, rather than attempting to look up a slope. There is often a road or track on a spur from which to commence a search.

iii. Segment a hill, spur or slope into sections and search between the sections using boundary markers.

iv. Safety is paramount as walking across slope is always more risky than walking down slope or up slope.

v. When searching the face of a slope consider using either a creeping line ahead approach or a staggered line approach to minimize rocks and debris being moved down the slope to other searchers.

vi. In any search of hilly or steep ground, control must be maintained and the speed of advance adjusted to suit the terrain and the capacity of the searchers. If this is not done, injuries, particularly to ankles and knees, may occur.
5.122. Expanding Square:

i. The purpose of this technique is to closely search an area of high probability. It is particularly useful for thorough coverage of small areas. This technique is suitable for a maximum of 15 searchers.

ii. A person is required to mark the outer boundary and ensure that the correct boundary is being followed.

iii. Another person is required to locate the inner boundary. This ensures an even movement of the search line from the inside edge.

iv. It is essential that the Team Leader directs the search from a central position behind the line.

v. Method: Mark out a grid square of approximately 50 metres centred around the area where close searching is required by using compass bearings and toilet paper or similar. Next:

a. search the inside of the grid with a contact search;

b. set up a line from one of the outside corners of the grid and move around the grid in one direction;

c. continue searching in this manner, spiralling out and around the grid square (it will gradually become circular);

d. the line will become unmanageable with more than 15 searchers; and
e. in very thick bush, an expanding square search will take about 3 hours to search an area 300 x 300 metres.

5.123. **Vehicle Search Patterns**: The search patterns discussed so far are suitable for searchers on foot or horseback and may be adapted for use with vehicles. Vehicles can be a major asset to a search when they are used to patrol boundaries, firebreaks and tracks. Where the land is open for long distances, particularly in the drier, more barren regions, vehicles can be sued to conduct sweeps across the land much the same as a foot team.

5.124. **Visibility**: A problem with vehicles travelling in formation is the loss of visibility owing to dust. This will be particularly prevalent in dry or arid conditions. When driving vehicles in dusty conditions, it will be necessary for following vehicles to travel outside the dust cloud of preceding vehicles.

5.125. **Echelon Pattern**:

i. The most suitable method under these conditions will be to echelon to the right or left of the leading vehicle. The vehicles need to maintain a position just slightly in front of the dust cloud so as to have adequate vision and adjust their position to suit the circumstances.

ii. If this method is adopted, the likelihood of vehicles colliding, striking obstacles or ditches, or becoming bogged is reduced.

v. The distance between the vehicles will depend on the terrain and the size of the object to be found. A general rule of thumb is that the bottom of the tyres must be able to be seen on the next vehicle. This will ensure that the vehicles are close enough to be able to see any missing person in between.

vi. Searchers within the vehicle must be strategically placed to scan the ground. At no time must any searcher be placed externally to the vehicle, eg on the roof rack or bull bar, while the vehicle is in motion. Standing on the roof rack while using binoculars to scan the area is a valid technique while the ignition keys are removed from the ignition of that vehicle.

v. Each vehicle should have at least four personnel. The driver’s role is to only safely navigate the vehicle. The passengers search where they are directed to by their team.
leader. The front passenger will search forward and 45° to each side. The rear passengers will search from 45° ahead to the rear on their respective sides.

5.126. **Urban Search Patterns**: Searching in an urban area can present some difficulties when it comes to determining which search pattern is best. Most of the above patterns are not suited to an urban environment and would present some safety hazards as members would be walking on roadways.

5.127. Urban searching requires houses, yards, industrial areas and vacant allotments being searched and cleared. To ensure each is done correctly and to ensure that all areas are covered they should be done systematically and methodically.

5.128. When searching a house it is important to ensure that all persons are outside and that no one enters except the searchers. One searcher will remain at a doorway to limit entry. A second searcher, or two, will enter the house and search all the rooms in a circular direction, starting with the rooms on the left. Each individual room is then searched in a circular pattern, looking in, under and over every piece of furniture in the room. As a room is cleared the door should be closed indicating that it has been done. Once the house is cleared the doors should be closed or the owners allowed to return.

5.129. A similar pattern is adopted when searching a yard, vacant block or industrial area. One searcher remains at the entry point to prevent other from entering. One or more searchers clear the area in a circular pattern. This will enable to entire area to be searched to a high probability and also ensures that no areas are left unsearched.

5.130. As with the house search, it is necessary for every object of a size capable of hiding a person to be searched. All buildings, sheds, outhouses and even dog kennels should be checked. Searchers should be instructed to look under objects, over then and in them. They should also look behind at regular intervals to check the reverse sides of objects. While adults may find it difficult to hide in a yard a child can quite easily locate a small nook and fall asleep while
searchers pass by unaware. Where possible have a mixture of male and female searchers in teams, as their different search techniques will compliment each other.

5.131. **Search Pattern Conclusion**: The Team Leader is responsible for ensuring the team is employed to best effect, so the search pattern adopted must suit the circumstances.

5.132. The leader should check team members at frequent intervals to ensure their safety and physical condition.

5.133. When vehicle extrication of the missing person or the search team is contemplated, it is advisable for a team member to move to the road, track or identified rendezvous to:
   a. await the arrival of the vehicle; and
   b. then guide the vehicle to the site.

5.134. When conducting a search, it is desirable to navigate by identifiable features rather than committing teams to navigate by compass. In areas where map and compass must be used, ensure that there are members within the team who are competent in their use.

5.135. **Clue recognition and Interpretation**: A clue is a fact, an object, information or some type of evidence that helps to solve a mystery or problem. The purpose of seeking clues (gathering all the facts and information) is to assist in the reasoning of a problem and its ultimate solution.

5.136. **General Principles**: The following principles apply:
   a. Clue seeking is an ongoing process that starts with planning, continues throughout a mission and doesn’t end until the debrief concludes.
   b. Clue seeking is a skill and must be practiced to develop a sense of what is the minimum information to work with.
   c. Avoid forming opinions and then gathering information to support that opinion.
   d. Don’t immediately form an opinion about the value of a clue.
   e. Gather information from everyone, as no one person can adequately gather all the facts.
f. Assemble a complete profile of the missing subject and the situation, and let it offer direction.

5.137. The theory of successful searching is dependent on clue detection and comprises five basic elements:
   a. Subject or clue generator.
   b. Clues or messages.
   c. Search area.
   d. searcher or clue seeker.
   e. Time, as it relates to a sequence of events.

5.138. Subject or Clue Generator: A lost person can become a prolific clue generator. The difficulty for searchers is separating these clues from those generated by other persons in the area. Strategic clues may suggest the period the person has been missing, their intent or destination. Tactical clues relate to clothing, equipment, footprints and discarded articles.

5.139. Clues to be Sought: Searchers should try to locate clues that provide the following messages:
   a. The present location of the subject is ............
   b. The previous location of the subject was ............
   c. The destination or intent of the subject was ............
   d. The subject was not here.

5.140. Categories of Clues: The categories of clues that searchers should seek are as follows:
   a. Physical (eg, footprints, clothing, equipment or food wrappers).
   b. Recorded Information (eg, a trip plan or trail register).
   c. Witnesses—People who knew of the intent or destination, or people who have seen the subject, or other persons in the search area.
   d. Events (eg, flashing lights, smoke, fire, or noise such as a whistle).

5.141. Search Area: Steps should be taken to contain the search area to reduce the amount of clues that may be generated. Where clues are found outside a designated search area, it may be necessary to extend the search area.

5.137. Searchers or Clue Seekers: The Field Search Controller needs to deploy the searchers or clue seekers throughout the search area and in particular, the most probable areas. A strategy is required to ensure that all clues are assessed and pertinent clues are acted upon.

5.138. Probability of Detection: Clue detection demands intelligence, concentration and determination on the part of the searcher. The loss of concentration and fatigue may inhibit clue detection. Therefore the SMC should employ a redundancy principle with the searchers to ensure that searchers can maintain their effectiveness.

5.139. Time Sequence: Time as it relates to a sequence of events is very important. All clues found should be time-tagged by searchers to assist in the reconstruction of events. It is essential that a log be maintained at the FSH to record the time and locations that clues were located.

5.140. Calculation of Search Time: When evaluating the search time available from search assets, certain factors must be taken into account, where applicable:
   a. total endurance of each SAR asset;
   b. transit time from FHQ or base to search area;
   c. necessary fuel reserves at final destination;
   d. first and last light at departure and destination
   e. weather conditions in the search area, and destination points, and any requirement for holding fuel or alternate aerodrome for aircraft.
   f. any other operational limitations; and

5.141. In most cases, time in transit to the search area may be calculated using speed and the distance between the points of departure and destination and the mid-point of a search area.

5.142. Operational factors may limit the search time available from a specific aircraft, examples being the time at which an aircraft will become available, distance from mandatory servicing
facilities, and other commitments of the operator that may require the return of an aircraft at a particular time.

5.143. **Investigation Time**: A search asset may sight objects that require investigation; therefore an allowance for the time taken to investigate must be made. The basic allowance is 15% of total time available in the search area, but the SMC may decide to increase this figure. The number of sightings investigated by previous search crews will influence any such decision. These, in turn, will be influenced by the nature of the terrain, the amount of flotsam on the sea etc. Over heavily timbered, mountainous terrain the allowance may need to be as high as 50% of total search time.

5.144. When obtaining data about aircraft availability, special consideration should be given to the speed at which the aircraft will be flown whilst on search. In general, to provide for optimum scanning by observers, search aircraft should fly as slowly as possible. There are, however, other aspects to be considered, particularly the time available for search and the need to cover the area expeditiously. It may be beneficial to discuss these interacting considerations with operators. Some aircraft operate in excess of 120 KTS when on search; although this is less than optimum, logistic considerations may dictate the use of these speeds.

5.145. Comparison of the search time required with that available will reveal whether the aircraft resources available are enough, too much or too little.

5.146. At this point, a critical decision related to aircraft allocation may be made. The time required for search is directly related to track spacing; track spacing, in turn, is directly related to search height. It is feasible, therefore, that despite first indications that insufficient resources are to hand, timely coverage of the whole search area could be achieved by the available aircraft for the sake of a higher-than-optimum search height.

5.147. **Briefings**: Briefing and debriefing is essential to the success of any search task. It would be difficult to locate a person if those involved are not correctly briefed as to what they are looking for and where they should be looking. It will also be difficult to identify and address issues that come to light if debriefing methods are ineffective. Searchers must understand their role and how to deal with any finds and other issues.

5.148. The two distinct parts to a briefing are:
   a. the preparation; and
   b. the conduct.

5.149. **Preparation**: Experience has proven that the selection of the best possible venue and the use of suitable aids will enhance the value of the briefing.

5.150. **Presentation**: The credibility of the briefing can be diminished if the briefing officer fails to project a professional approach.

5.151. **Venue**: The selection and preparation of the best venue available is vital for the delivering of information and retaining attention. Consideration should be given to:
   a. Large enough to accommodate all attendees comfortably.
   b. Open to authorised personnel only.
   c. Identified as a briefing area so that seating and display arrangements may be laid out in advance. This area may also function for media/public relations/briefings.
   d. Situated so there is minimum distraction by outside activities.

5.152. **Lighting**: Adequate lighting needs to be provided so that all present can see displays clearly and can take notes.

5.153. **Weather Protection**: Where possible, the briefing should be held in a covered location where protection from wind, rain or sun is provided. In field conditions, efforts should be made to ensure that the area is as protected as the circumstances allow.
5.154. **Briefing Aids**: The following may be considered for use during a briefing:

a. **Maps**—A map will be required to show Team Leaders their areas of responsibilities and their relationship to other teams and activities. These may range from a topographical map to a map scratched on the ground. In any case, do not clutter the map with unnecessary detail. If possible, copies of the map should be provided to Team Leaders for their own reference and their subsequent briefings of their teams. If maps are not provided, time needs to be allowed at the end of the briefing for Team Leaders to make copies of their relevant sections.

b. **Models**:
   (1) Map models take a long time to prepare and are generally of little use.
   (2) A model figure similar in stature and dress to the missing person may be useful in some circumstances.

c. **Photographs**—Attempt to obtain a recent photograph and circulate copies to searchers. If employing aerial photographs, ensure that those interpreting them are competent in their use. This style of photography may be very confusing to the uninitiated.

d. **Display/Chalk Boards**—One of the most useful aids is the display/chalk board. If information is to be displayed using this system, ensure that it is kept out of sight until required. When the board is produced, ensure that it can be seen by everybody. To gain the most advantage from this medium, coloured chalks or pens should be used to highlight the display so as to make it as clear as possible. The briefing officer should explain clearly the information displayed.

5.155. **Conduct**: Once having prepared the venue and aids, the briefing must be conducted in such a manner that the briefing officer controls the activity.

5.156. **Sequence**: To ensure the briefing flows smoothly, observe this sequence:

a. **Introduction**—The briefing officer should thank all for attending, and introduce him/herself. State his/her position and operational role. State the content of the briefing;

b. **Visibility**—Ensure that all present can see the briefing officer, and any aids used;

c. **Notes**—Ensure that everybody present has writing materials, and is prepared to take notes (writing materials should be on hand);

d. **Maps**—Maps should be issued before the start of the briefing so that they may be marked or referred to as the briefing proceeds;

e. **Questions**—Stipulate that there will be no questions or interruptions during the conduct of the briefing and that time will be made at the end for any questions. Regardless of circumstances, time must be allowed at the end for questions and answers; and

f. **Topography**—Before the briefing, it is necessary to describe the area where the teams will be operating. Ensure that all present can identify this location and can orientate themselves to the ground. The briefing officer should then explain all features relevant to or likely to effect the plan, including:
   (1) the terrain in the area;
   (2) difficulties in travel;
   (3) possible hazards; and
   (4) any other similar related information. Control features, such as start and finish points and boundaries, should be highlighted.

5.157. **Orders**: Operation orders are conveyed to those whose task it is to carry out the Search Commander/Field Search Controller’s requirement. Such orders need to be:

a. correctly prepared;

b. presented in a systematic way to ensure those receiving the orders understand their tasks; and
c. re-examined as a result of information gained through debriefs.

5.158. Orders must:
   a. be accurate;
   b. be brief but clear;
   c. contain all necessary information;
   d. be capable of being actioned; and
   e. be received in time to be acted upon.

5.159. Layout of Orders: Orders need to follow a logical sequence to ensure all aspects of the plan are covered. To achieve this, orders are divided into five main headings of:
   a. Situation;
   b. Mission;
   c. Execution;
   d. Administration and logistics; and
   e. Command and communications.

By employing the first letter of each heading, the catch-word SMEAC is derived.

5.160. Situation (What has happened): This gives the background of events in sequence (what has happened what is happening) and gives general details of the teams that will be employed. This may include the following:
   a. Person/Object—Relevant details regarding the missing person or object.
   b. Topography—A general description of the search area using maps, sketches, air photographs, sand models etc.
   c. Other Search Teams Operating—The teams which share search boundaries with your area. Details include:
      (1) identification; and
      (2) other relevant information as applicable.
   d. Additional Resources—Those which need to be available for the operation are:
      (1) aircraft: fixed-wing and helicopters (if helicopters are available for support, give locations of known landing points in the search area);
      (2) vehicles;
      (3) dogs;
      (4) horses; and
      (5) trackers.
   e. Own Resources—This is particularly important when briefing search teams from other areas who are not familiar with your procedure. This should include names of key personnel, layout of headquarters, medical and welfare facilities etc.

5.161. Mission (What the task is): The mission is a clear, concise statement of the task. It should begin with: ‘Our mission is to .........................’. This statement should be only one sentence long and needs to be repeated so that teams are sure of their task.

5.162. Execution (How the task is to be accomplished): This begins with an outline description of how the task is to be conducted, immediately followed by a detailed description of the roles and tasks of each team. To ensure that no relevant points are missed, these sub-headings should be used:
   a. General Outline—This is a short description of the overall conduct of the operation so all teams involved are aware of the broad picture; eg. ‘The search will be conducted in the areas shown and will involve six teams. Four teams will be employed in the initial search and two will be held in reserve. Should there be no result in this area, the search will be expanded’.
   b. Detailed Roles and Tasks—Each team will be given all the relevant instructions required so that the team may perform the allocated tasks:
      a Role—A general statement is required. eg. ‘Team One will be searching the area marked A on the map’.
b. **Tasks**—This should be used only where there is a requirement for a team to perform other tasks not described under its role; eg. ‘Team One, in addition to searching your allocated area, you will act as a radio relay between other search teams and this headquarters as required’.

c. **Method**—It may be necessary to explain how the role will be performed; eg. ‘Team One, it is suggested that the creeping line ahead search method would prove suitable. Commence at the junction of the road and wire fence at (grid reference, and/or description), search to the north so as to finish at this point (grid reference and/or description). Pay particular attention to any heavy cover or heavily-grassed areas, make sure the boundaries of each sweep are clearly marked’.

d. **Boundaries**—If boundaries are to be employed by search teams, they must either:
   a. be clearly defined physical features (roads, fences, power lines); or
   b. be marked by the teams as they progress.

e. **Special Equipment**—This will apply to special items allocated to specific teams, (details of equipment common to all should be detailed under the administration and logistics heading).

f. **Co-ordinating Instructions**—These are the details common to all teams by which the Field Search Controller maintains control of the operation:
   a. All timings should be given in this block. If the operation is to proceed by phases or teams are to commence their tasks at differing times, this is where such timing should be specified.
   b. Movement/Navigation Details:
      i. to and from start/finish point;
      ii. what routes will be employed;
      iii. what method of transport will be employed (by foot, vehicle, aircraft, etc.); and
      iv. any specialised transport arrangements such as helicopter, to include landing and pick up zones.

g. **Action If.....**:
   a. the operation is terminated before the planned finish time;
   b. the person is found uninjured;
   c. the person is found injured;
   d. the person is found dead;
   e. a team member becomes injured; or
   f. a team member becomes lost.

h. **Medical Casualty Evacuation**—This details the procedure to be adopted for both team members and the missing person(s).

5.163. **Administration and Logistics (What support will be provided and how):** The following should be considered under this heading:
   a. **Food and Water**—If a meal will be provided before commencement (where and when). If water is to be carried by participants, how long it will be required to last.
   b. **Re-supply**—If re-supply of food, water or equipment in the field is planned, what the arrangements will be.
   c. **Dress and Equipment**—Directed initially at the individual member, then for the team (team items include first aid kits, stretchers, maps, compasses or any other equipment to be carried within the team).

5.164. **Command and Communications (Who will be in control and how the communications will function):** The following should be considered under this heading:
   a. Where the headquarters is located.
   b. Who is in charge of specific tasks and command structure.
   c. Communications:
5.165. **Issuing orders**: At the conclusion of a briefing, those persons required to be issued with orders should be directed to remain whilst others are released to continue with preparations. To ensure that orders are presented in a logical, detailed manner:
   a. utilise the SMEAC system;
   b. read from prepared, sequentially-numbered pages;
   c. present the orders at a speed which enables attendees to write down pertinent information; and
   d. repeat the mission and all grid references to ensure clarity.

5.166. **Synchronisation of watches**: This should occur before taking questions.

5.167. **Questions from the teams**: To maintain control, it should be indicated that questions will be taken after a nominated period, (eg. 5 minutes). Then, the briefing officer should ask each Team Leader in turn, if there are any questions and then provide the answers.

5.168. **Questions to the teams**: Check that the briefing has been assimilated by directing questions to the Team Leaders about roles, tasks, boundaries, timings, call signs and other relevant information. The briefing officer should then indicate that the briefing has concluded and all participants may carry out their allotted tasks. Time should be allowed for Team Leaders to conduct a briefing of their team prior to commencing the search.

5.169. **Code Word**: A code word, to be employed in the event that the person is found and believed to be dead, should be given. This will notify the SMC immediately of the situation and should be followed by the location of the team.

5.170. **Action on locating the missing person(s)**: Prior to the deployment of search teams, the action to be taken in the event of a team locating the person must be defined and clearly understood by all searchers. This action must form part of the briefing to search teams. The suggested action to be taken where a person is found dead is as follows:
   a. The searcher locating the missing person immediately informs the Team Leader who will make an assessment.
   b. In the event that the person is believed to be dead, the Team Leader will ensure minimal disturbance of the immediate scene by instructing all members of the team to remain clear of that person, to a distance of approximately 30 metres. If possible the area should be marked off with tape or rope.
   c. Only the Team Leader and a First Aid Qualified person will approach the body to check for pulse and breathing. It is essential that two people check the body to prevent mistakes.
   d. In the event the person is alive all medical assistance possible will be given.
   e. If the person is deceased, the finder and Team Leader will retrace their steps and maintain the cordon. All deceased persons and their locations are to be treated as Crime Scenes until advised otherwise by an investigating police officer.
f. As soon as practicable, the SMC and/or Field Headquarters should be informed using the assigned code word and arrangements made for the Police to attend that location.

g. The team will maintain the security of the scene until relieved.

5.171. It must be remembered that information transmitted through the radio network may be heard by many people including the media, relatives and friends of the missing person. Some of these people may already be in a distressed state and will be sensitive to any thoughtless comments on the condition of the missing person. Therefore, it is important that all searchers use the designated code word and think before passing their assessment on any person’s condition through the radio network.

5.172. It is also worth considering the use of a code word in the event that the missing person is found and is seriously injured.

5.173. **Mattson Consensus**: Determining which segments to search when there are not enough resources to cover the entire search can be daunting for any SMC, especially when there is pressure to get the job done. One aid that can spread the burden of this is the Mattson Consensus, although the ultimate responsibility will always rest with the SMC. The search area is divided into smaller search segments with each being given a letter or number. This letter or number is entered into the ‘Search area’ column of the table. The SMC then chooses a number of trustworthy persons, such as the SES Controller, a knowledgeable local, Park ranger etc, who then look at the various search segments. Each person independently determines the probability of the target being in each of the segments. There is always one extra segment, called ‘The Rest of the World’ or ROW which covers everywhere outside the search area.

5.174. Each of the people assign a number value to each segment with the highest value going the segment they believe the target has the greatest chance of being located in. There is no total value for this exercise. Adding across the table you arrive at the total for each of the search segments. Working out the percentage you can see that area C has the highest with a consensus of a 0.23 chance that the target will be in that area, with area B coming in second at 0.19. Area F and ROW are the least likely areas according to the consensus.

5.175. The SMC can now allocate resources according to the priorities as in the consensus, or can ignore it and go their own way.
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<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
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Consensus Worksheet