

MISSION AIRCREW PROCEDURES AND REFERENCE



OWNER: _____

UNIT: _____

PHONE: (_____) _____

PLEASE RETURN IF FOUND

CALIFORNIA WING EDITION
REVISED: 4 SEPTEMBER 2014

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IMPORTANT

CHECKLISTS AND PROCEDURES ARE
FOR **REFERENCE ONLY**.

PILOT-IN-COMMAND WILL USE
AIRCRAFT MANUFACTURER CHECKLIST
OR OTHER CHECKLIST APPROVED BY
NATIONAL HQ (per CAPR 60-1)

**EMERGENCY
PROCEDURES**

**AIRCRAFT
SYSTEMS**

**BRIEFING
GUIDE/ROLES**

**ELECTRONIC
SEARCH OPS**

**VISUAL
SEARCH OPS**

**AERIAL
IMAGING OPS**

**AIR/GROUND
PROCEDURES**

**COMMS
REFERENCE**

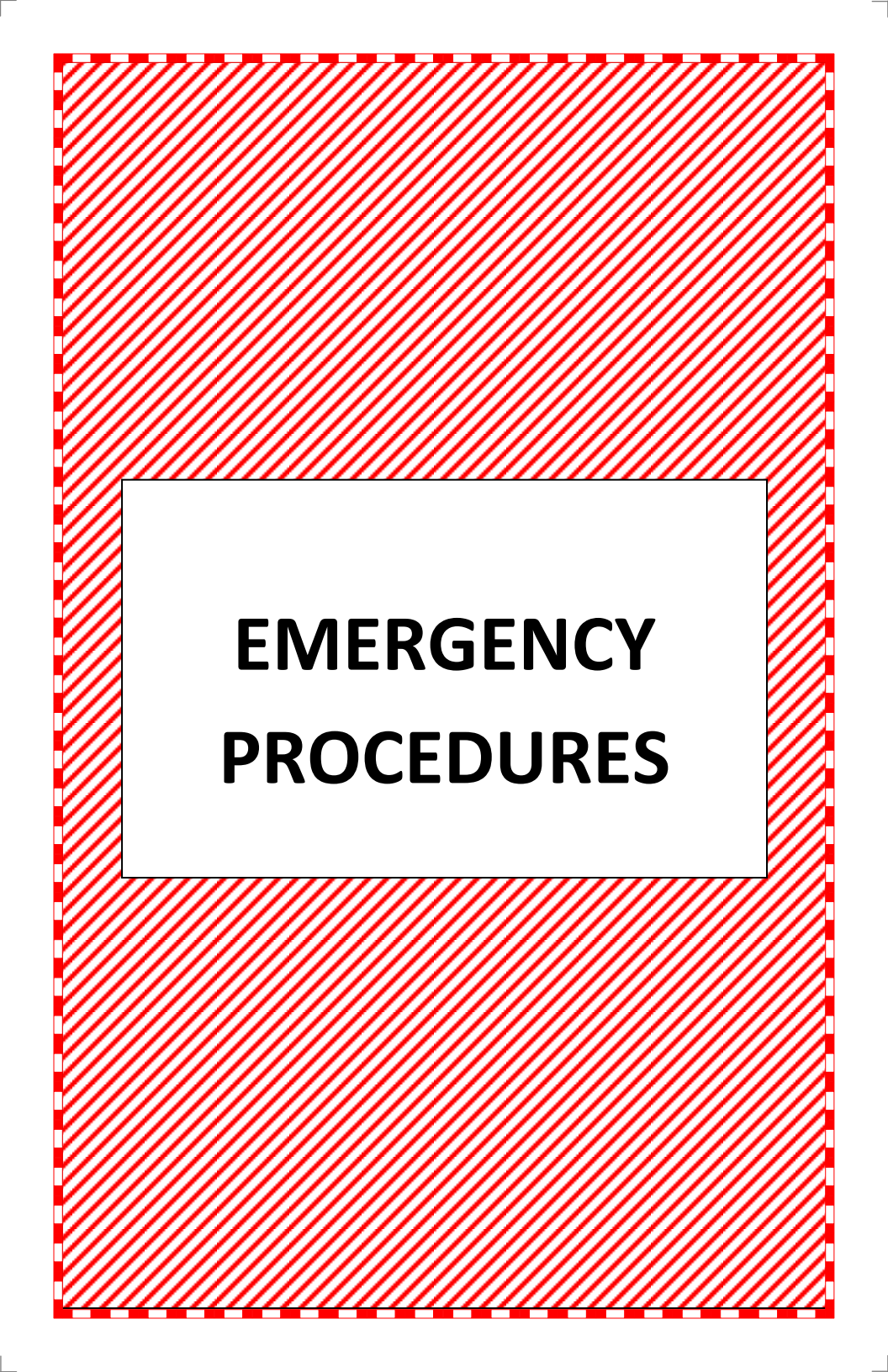
**GENERAL
REFERENCE**



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**EMERGENCY
PROCEDURES**

EMERGENCY PROCEDURES – MISSION PILOT

IN-FLIGHT EMERGENCY

1. Aircraft – **MAINTAIN CONTROL** and **CLIMB**
2. Situation – **ASSESS** problem and use entire crew to solve
3. Checklist – **REQUEST MO** read appropriate checklist

OFF-AIRPORT LANDING

1. Aircraft – **BEST GLIDE** (lower speed below max gross)
2. Intentions – **ANNOUNCE** to crew
3. Landing site – **LOCATE** and obtain input from crew
4. Radios – **REQUEST** Observer broadcast MAYDAY and position
5. Door – **OPEN** and close latch
6. Seat belts – **TIGHTEN**
7. Aircraft – **CONTROL** until movement stops

EMERGENCY EGRESS

1. Flaps – **RAISE** in C206 or Maule
2. Give command of “**EGRESS, EGRESS, EGRESS**” when aircraft stops
 - a. C182 – Follow Observer out Observer door
 - b. C206 – Exit out Pilot door
 - c. Maule – Exit out Pilot door
3. Crew – Meet 50 feet from tail of aircraft or upwind

EMERGENCY PROCEDURES – SCANNER / AERIAL PHOTOGRAPHER

IN-FLIGHT EMERGENCY

1. Situational awareness – **MAINTAIN** – **do not panic**
2. Survival kit – **SECURE** and lap load
3. Loose equipment – **SECURE**
4. Landing site – **LOCATE** and recommend to pilot (use clock method)
5. Seat belts – **TIGHTEN**
6. Landmarks – **IDENTIFY** to assist Observer in confirming location
7. Touchdown – **BRACE** with chin tucked and forearms over face

EMERGENCY EGRESS

1. Exit on command of “**EGRESS, EGRESS, EGRESS**”
 - a. C182 – Exit out Pilot door
 - b. C206 – Exit out Scanner door (RAISE FLAPS)
 - c. Maule – Exit out Scanner door (RAISE FLAPS)
2. Crew – Meet 50 feet from tail of aircraft or upwind

EMERGENCY PROCEDURES – MISSION OBSERVER

IN-FLIGHT EMERGENCY

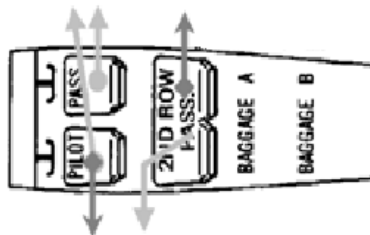
1. Situational awareness – **MAINTAIN** – do not panic
2. Checklist – **READ** appropriate section to pilot
3. Transponder – **SET** to 7700
4. GPS – **NOTE** current Lat/Long
5. VHF radio – **SET** to 121.5
6. VHF radio – **BROADCAST MAYDAY, MAYDAY, MAYDAY**
 - a. Call Sign/Aircraft Type/Tail Number
 - b. Situation
 - c. Position (LAT/Long)
 - d. Souls on board
 - e. Fuel on Board (in minutes)
 - f. Intentions / Assistance Requested
7. FM radio – **BROADCAST Mayday with position to Highbird / Mission Base**
8. Seat – **MOVE** to full rear position
9. Door – **OPEN** door and **CLOSE** latch
10. Seat belts – **TIGHTEN**
11. Touchdown – **BRACE** with chin tucked and forearms over face
12. Radios – **BROADCAST** position until aircraft stops
13. Fire Extinguisher – **USE** as needed

EMERGENCY EGRESS

1. **Exit on command of “EGRESS, EGRESS, EGRESS”**
 - a. C182 – Exit out Observer door
 - b. C206 – Exit out Pilot door
 - c. Maule – Exit out Observer door
2. Crew – Meet 100 feet from tail of aircraft or upwind of smoke
IF EGRESSING INTO WATER DO NOT DEPLOY PERSONAL FLOTATION DEVICE UNTIL CLEAR OF AIRCRAFT

C182: OBSERVER AND SCANNERS EXIT FRONT RIGHT DOOR

C206: PILOT AND OBSERVER EXIT FRONT LEFT DOOR
C182: OBSERVER AND SCANNERS EXIT FRONT RIGHT DOOR (LEFT DOOR AFTER PILOT OPTIONAL)



C206: SCANNERS EXIT REAR RIGHT DOOR

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G1000: CONFIGURING FOR FIRST USE

PREFLIGHT THE G1000 SYSTEM TO ENSURE SETTINGS ARE CONFIGURED CORRECTLY BEFORE LAUNCHING.

1. MFD: Select AUX Section and Page 4 (System Setup)

- a. FACTORY DEFAULTS press DFLT5 softkey to reset to factory
- b. TIME FORMAT (Local 24 hour or UTC – as briefed)
- c. NAV ANGLE (MAGNETIC)
- d. POSITION COORDINATES (DDD° MM.mmm)
- e. MFD DATA BAR FIELDS
 - I. FIELD 1: **GS**
 - II. FIELD 2: **DIS**
 - III. FIELD 3: **ETA**
 - IV. FIELD 4: **BRG**
- f. AIRSPACE ALERTS (as req'd) and ALTITUDE BUFFERS (100ft)

2. Verify G1000 system function, Database dates, and version numbers: Select AUX Section and Page 6 (System Status)

3. MFD: Map Display Settings (Navigational Map Page)

- a. Restore FACTORY DEFAULTS: (1) Press MENU, (2) Highlight *Map Setup*, Press ENT, (3) Highlight MAP group, (4) Press MENU, (5) Select *Restore All Defaults*, press ENT
- b. Configure for CAP (Recommended)
 - I. ORIENTATION (NORTH UP)
 - II. AUTO ZOOM (OFF)
 - III. LAND DATA (ON)
 - IV. TRACK VECTOR (ON)
 - V. WIND VECTOR (ON)
 - VI. NAV RANGE RING (ON)
 - VII. TOPO DATA (ON)
 - VIII. TOPO SCALE (OFF)
 - IX. OBSTACLE DATA (ON)
- c. Setup Map to display Lat/Long Grids (Nav Map → MENU)
 - I. Select GROUP, select LAND group using small FMS knob
 - II. LAT/LONG (TEXT) (Med)
 - III. LAT/LONG (RNG) (30NM)

IMPORTANT

Per CAP SOP: All Corporate G1000 aircraft MUST operate with Terrain Awareness and Traffic Alerts **ENABLED**.

This data should be displayed on both PFD and MFD.

G1000: MFD ARCHITECTURE

QUICK REFERENCE OF THE AVAILABLE SECTIONS AND PAGES

MAP

1. Navigation Map
 MAP
 DCLTR
 SHW CHRT
2. Traffic Map
 STANDBY
 OPERATE
 TEST
 ALT MODE
3. Stormscope
 MODE
 VIEW
 CLEAR
4. Weather Data Link
 NEXRAD
 ECHO TOP
 CLD TOP
 LTNG
 CELL MOV
 SIG/AIR
 METAR
 LEGEND
 MORE WX
 SFC OFF
 FRZ LVL
 WIND OFF
 COUNTY
 CYCLONE
 LEGEND
 BACK
5. Terrain Proximity
 VIEW

WPT

1. Airport Information
 MAP
 CHRT
 INFO
 DP
 STAR
 APR
 WX
 NOTAM
 2. Intersection Info
 MAP
 3. NDB Information
 MAP
 4. VOR Information
 MAP
 5. User WPT Information
 MAP
 NEW
 DELETE
 RENAME
- ### **AUX**
1. Trip Planning
 MAP
 AUTO / MANUAL
 FLP / WPTS
 2. Utility
 3. GPS Status
 GPS1 / GPS2
 RAIM / SBAS
 4. System Setup
 DFLTS
 5. XM Information
 RADIO (XM RADIO)
 INFO (XM INFO)
 6. System Status
 LRU
 ARFRM
 DBASE
 ANN TEST

NRST

1. Nearest Airports
 MAP
 APT
 RNWY
 FREQ
 APR
 LD APR
 SHW CHRT
 2. Nearest Intersections
 MAP
 3. Nearest NDB
 MAP
 4. Nearest VOR
 MAP
 VOR
 FREQ
 5. Nearest User WPT
 MAP
 6. Nearest Frequencies
 MAP
 ARTCC
 FSS
 WX
 7. Nearest Airspaces
 MAP
 ALERTS
 FREQ
- ### **FPL (Press FPL key)**
1. Active Flight Plan
 MAP
 VIEW
 CNCL VNV
 SHW CHRT
 2. Flight Plan Catalog
 MAP
 VIEW

G1000: ENTERING WAYPOINTS & GRID CORNERS

DIRECT INPUT METHOD (VIA WAYPOINTS PAGE)

Preflight planning: determine lat/long of target grid's corners

1. **Aircraft:** MFD: Go to USER WAYPOINT PAGE of the WAYPOINT (WPT) CHAPTER using the FMS knob
2. Display New Waypoint Screen – **PRESS NEW** (MFD Softkey)
3. **Name the new waypoint** using the standard convention: [Grid#][1/4 Grid Letter][Corner ID]: 173DNE, 173DSW
4. Confirm – **PRESS ENTER**
5. Change TYPE from RAD/DIS to LAT/LONG – **inner FMS knob**
6. Confirm – **PRESS ENTER**
7. Enter lat/long for the corner: MOVE CURSOR using large FMS knob / CHANGE VALUES using inner FMS knob
8. Confirm coordinates – **PRESS ENTER**
9. Repeat Steps 2-8 until all 4 grid corners are entered

HASTY METHOD (CREATE FROM CURRENT POSITION)

1. MFD on MAP PAGE, Mark position – **TAP RANGE KNOB**
2. Create user waypoint – **PRESS ENTER**
3. Follow Steps 3-8 above to complete waypoint

G1000: MODIFY A SAVED WAYPOINT

1. Select USER WPT INFORMATION page in the WPT chapter
2. Press FMS knob, select waypoint (scroll if needed)
3. Use FMS knobs to edit data, press ENT when done

G1000: OUTLINING SEARCH GRID

1. Grid Corners - **ENTER ALL 4** as User Waypoints
2. Bring up Flight Planner – **PRESS FPL** button
3. Activate cursor – **PUSH FMS** knob
4. Find initial Grid Corner – **PRESS ENT** to select
This is the corner you will fly to first
5. **Select remaining corners in order of flight**
6. **Re-select the initial grid corner** (from Step 4) to complete the box.
7. **Activate Flight Plan**

G1000: SEARCH AND RESCUE PACKAGE

1. Enter Flight Planning mode on MFD – **PRESS FPL** then **MENU**
2. Select **Search and Rescue** – **PRESS ENT**
3. **Select search pattern:** Parallel, Expanding Square or Sector
4. **Select waypoint as IP for pattern** (Grid corner for Parallel, center point for Expanding Square or Sector)
5. **Initial DTK** – Enter heading to fly upon reaching Waypoint
6. **Initial Turn** – Turn at end of first leg (consider position of MS)
7. **Leg Length** – Length in NM of each leg (for CAP ¼ grid: 7.5nm for N/S legs; 5nm for E/W legs)
8. **Spacing** – distance between legs (.1NM to 9.9NM). Recommend .5nm spacing for heavily wooded terrain
9. **Number of Legs** – tracks to complete search area (10 legs @ .5nm spacing for CAP ¼ grid N/S)

G1000: ROUTE SEARCH WITH OFFSET

1. Enter the flight plan (route of missing aircraft) – **PRESS FPL**
2. Configure OFFSET from route (we want to fly to the left or right of the missing aircraft's route) – **PRESS MENU**
3. Scroll down to **PARALLEL Track** then **PRESS ENT**
4. **Select which side of route to fly.** Select RIGHT to put route on MS (left) side; Select LEFT to put route on MO (right) side)
5. **Select offset distance** (minimum 1NM)
6. Accept offset values – **PRESS ENT**
7. MFD will display original route as gray line and offset as magenta line. Offset waypoints are denoted by “-p” in flight plan

BECKER SAR-DF-517 / RTHETA RT-600 PROCEDURES

POWER-UP

1. Aircraft Master power – ON / Avionics 1 & 2 – ON
2. Mission Master power – ON / DF Unit power - ON
3. **Becker 517:** Select mode (Training or Emergency) using **PAGE**
4. **Frequency** – SET using lower right knob (Training: 121.775)
Scan: Automatically monitors 121.5, 243, 406 range
5. **Brightness** – ADJUST as needed. Press **REP** and turn **PAGE** knob
6. **Becker 517:** Tracking Page Mode (360°/90°/ or Text Bearing)
7. Page – SET as desired using Page knob
 - a. SAR-DF 517: Page 1, 360° mode
 - b. RT-600: DF page
8. Volume – SET as desired using lower left knob
9. Squelch – SET to above noise level
10. Audio panel – PRESS ADF or AUX to monitor signal

TRACKING A SIGNAL

1. Direct course changes using displayed **relative bearing** to current aircraft heading; it is not a true course
2. Maneuver aircraft so bearing is +/- 5°
3. **Becker 517:** Set to 90° for greater sensitivity close to source
4. **Squelch** – REDUCE to lower level, below 50%
5. **G1000 MFD** – select NAV MAP (PRESS CLR for 2 sec)
6. **Mark Position** when source bearing flips (aircraft has passed it)
PRESS RANGE knob and then **ENT** to save
7. **Repeat passes** as necessary to improve precision of fix
8. Crew – **TRANSITION to visual search**

BECKER SAR-DF-517 / RHOETHETA RT600 QUICK REFERENCE

Press: F1 function

Hold: Clear bearing averaging and Last Signal timer

Press: F2 function

Press: Dim mode

Hold: Show last valid bearing and signal strength

DF page: Set squelch

MEM page: Select memory slot

Squelch level
Signal strength

Bearing mode: Switch to DF and MEM pages

Dim mode: Adjust brightness

Squelch mode
<blank> = manual
A, X = auto

Bearing mode: Switch between bearing view and 406 MHz data block decoding

● Relative bearing to signal
⊙ Signal variance

Time since last COSPAS-SARSAT message received

DF page: Set volume

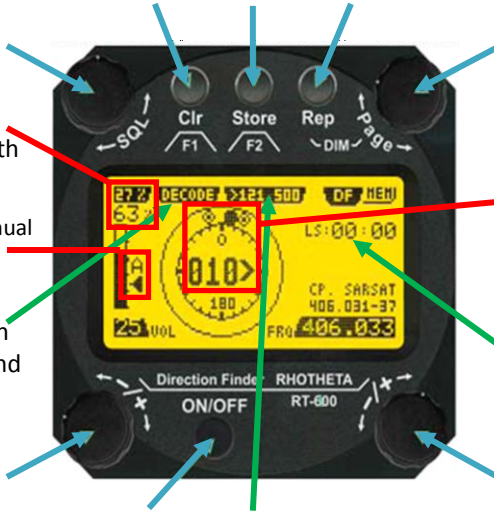
MEM page: Set frequency MHz

On/Off
(RT-600 does not switch between Emergency and Training modes at power-on)

Bearing mode: Switch between monitoring 121.5 MHz and 406 MHz

DF page: Select frequency

MEM page: Set frequency



Press = 1 sec / Hold = 2+ sec

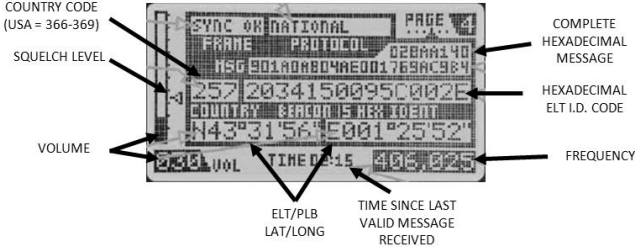
FREQUENCY SELECTION ORDER

EMERGENCY	TRAINING (PROGRAMMABLE)
156.800 (CH16 / SEABAND)	156.525 (SEASTATION/MARINE)
121.500 AIRBAND VHF (Civilian)	121.775 (Test Frequency 1)
243.000 AIRBAND UHF (Military)	243.300 (Test Frequency 2)
406.025/28 COSPAS/SARSAT	406.100 (Test Frequency 3)
SCAN MODE (121.5/243/406)	SCAN MODE (TestFreq1+2+3)

Becker 517 Screens



Pg 1: 360° VIEW Pg 2: 90° VIEW Pg 3: TEXT BEARING



Pg 4: BECKER 517 COSPAS/SARSAT ANALYSIS



RT-600 COSPAS/SARSAT ANALYSIS

RT-600 COSPAS/SARSAT CHANNEL GROUPS

GROUP NAME	FREQUENCY RANGE	COSPAS-SARSAT CHANNELS*	
CPSAR1	406.022 / .025 / .028	A, B, C	1, 2, 3
CPSAR2	406.031 / .034 / .037	D, E, F	4, 5, 6
CPSAR3	406.040 / .043	G, H	7, 8
CPSAR4	406.046 / .049 / .052	I, J, K	9, 10, 11
CPSAR5	406.055 / .058 / .061	L, M, N	12, 13, 14
CPSAR6	406.064 / .067 / .070	O, P, Q	15, 16, 17
CPSAR7	406.073 / .076	R, S	18, 19

* Channels can be identified by either Letters and Numbers

Note: Becker 517 only receives Channels B and C (2 and 3)

TDFM-136 CAP DIGITAL FM RADIO OPERATION



POWER UP

1. Aircraft Master Power – ON / Aircraft Avionics Power - ON
2. Mission Master – ON / Main/Off Switch – SET TO MAIN
3. G1000 Audio Panel – Select COMM3 to RX/TX on CAP Radio
4. Seat Selector – Seat 2 for MO, 3 for MS (mic control)

VOLUME

1. MAIN and GUARD Switches – TURN TO ADJUST VOLUME (each)

NORMAL OPERATION

1. MN/GD Switch – SET TO MN (TX on MAIN) or GD (TX on G1/G2)
2. G1/G2 Switch – SET TO G1 (CAPGUARD) or G2 (TAC1) as needed*
3. HI/LO Switch – SET TO HI

ARROW KEYS

1. Left Arrow (#4) – Scrolls **backwards** through channels
2. Right Arrow (#6) – Scrolls **forwards** through channels
3. Up Arrow (#2) – Brightens Display
4. Down Arrow (#5) – Dims Display

DIRECT CHANNEL ENTRY

1. Press **CHAN** key
2. Enter 3-digit channel number (add zeros as needed)
3. Press **# ENTER** key

SCAN MODE

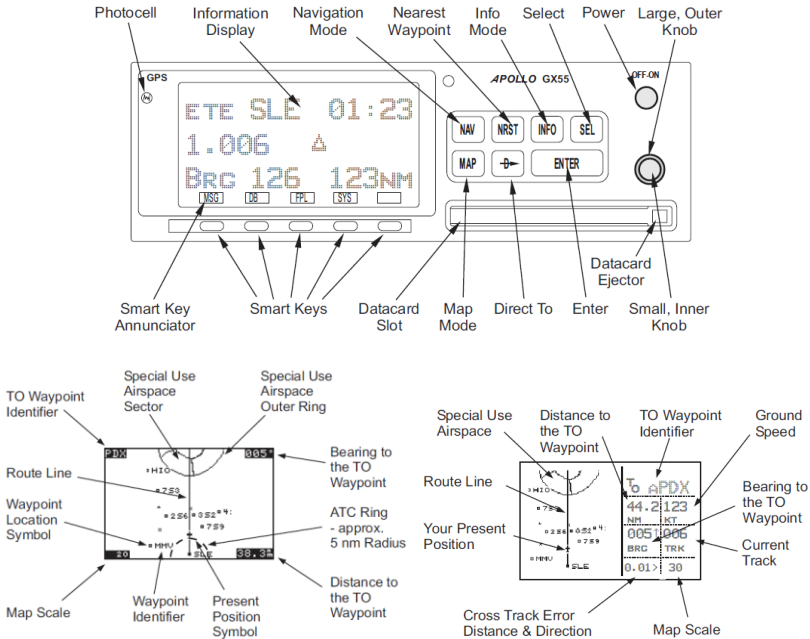
1. **#5** Key – Enables Scan of all frequencies (if set by Wing Communications staff)

GUARD MODE OPERATION

If message received over GUARD Freq – SET MN/GD to GD, RESPOND THEN RESET TO MN. GUARD is for hailing only.

*per CAWG programming

APOLLO GX55 REFERENCE



GX55: SAR MAP SETUP

1. **PRESS MAP** then LK to **MAP Setup** page. SK CCW 2 to **SAR MAP** setup page.
2. **Press SEL** then SK to **ON**
3. LK to select **US/BASIC**. Grid type = SK to **US**
4. LK to select **Position**. SK to select chart. **PRESS ENTER**
5. Press **[GRID]** to change grid view (Grid3 shows quarters)

GX55: CREATE USER WAYPOINT BY LAT/LONG

1. **Press NAV** then **[DB]**. LK to **Create User Wpt by Lat/Lon**. **ENTER**
2. **Use LK/SK** to enter name, Lat/Long and rwny length. **ENTER**

GX55: MODIFY WAYPOINT

1. **Press NAV** then **[DB]**. LK to **Modify User Wpt**. Press **ENTER**
2. **SK** to select waypoint. Press **ENTER**
3. **LK/SK** to edit information. Press **ENTER**

GX55: CREATE FLIGHTPLAN

1. Press **NAV** → **[FPL]**. LK to **Create a New Flightplan**
2. Press **SEL** → SK/LK to enter FP name (8 char max). Press **ENTER**
3. **Enter FROM waypoint:** SK **SEL**. SK **select type**. LK/SK **enter wypt**. Press **ENTER**
4. **Enter TO waypoint:** SK **SEL**. SK **select type**. LK/SK **enter wypt**. Press **ENTER**
5. **Repeat** for remaining waypoints
6. Press **SEL** when FP is complete. SK to **review legs**. **SEL** while viewing to make changes.
7. **ACTIVATE** when finished

GX55: CREATE FROM/TO/NEXT WAYPOINTS

1. Press **NAV** → LK to **FM/TO/NEXT** → Press **SEL**
2. LK to **FROM** → SK to **INS** → Press **ENTER**
3. SK to **select wypt type** → LK/SK to **edit** → Press **ENTER**
4. **SEL** → LK to **TO** → Press **ENTER** → **Repeat** Steps 2 and 3
5. **SEL** → LK to **NEXT** → Press **ENTER** → **Repeat** Steps 2 and 3
6. **Edit:** LK to **FM/TO/NEXT** → Press **SEL** → LK to **wypt** → SK to **edit** → Press **ENTER** when finished

GX55: MARK CURRENT POSITION

7. Press **MAP** → LK to **SAR MAP**
8. Press **[MARK]** to **create wypt at present location**
9. LK/SK to **change waypoint name**. Press **ENTER**

GX55: CREATE / DIRECT-TO USER WAYPOINT FROM GRID

1. Press **[DB]** → LK to **Create User Wpt by US Grid** → Press **ENTER**
2. LK/SK to **select desired grid location** → Press **ENTER**
3. Press **DIRECT-TO** → SK to **select wypt** → Press **ENTER**

GX55: WAYPOINT INFORMATION LOOKUP

1. Press **[DB]** → LK to **Access Database** → Press **ENTER**
2. SK to **choose wypt type** → LK/SK to **select wypt** → Press **INFO**
3. Press **ENTER** or **INFO** to exit Lookup

GX55: SELECT A SAR SEARCH PATTERN

1. Press **MAP** → LK **CW2** to **SAR MAP** → Press **[PAT]**
2. SK to **select desired pattern** → Press **ENTER**

ROUTE SEARCH

1. **Enter FROM and TO waypoints** (see above)
2. Press **NAV** → Press **SEL**
3. LK to **Direction** field → SK to **select LEFT or RIGHT** offset
4. LK to **Distance** field → SK to **select offset distance**
5. LK to **Offset** field → **Use** will flash → Press **ENTER**
6. "p" appears next to wypt ID, indicating Parallel Track is in use

PARALLEL LINE / GRID SEARCH

1. Press **SEL** → LK/SK to select **GRID**
2. LK to select **SPACING** → SK to **0.2 to 9.9 nm**
3. LK to select **DIRECTION** → SK to **N/W or E/W** → Press **ENTER**
4. Press **ENTER** to activate / Press **[PAT]** to disable search pattern

CREEPING LINE SEARCH

1. Press **SEL** → **INS? Flashes** → Press **ENTER**
2. **Choose wypt** → Press **ENTER**
3. LK to select **SPACING** → SK to **0.2 to 9.9 nm**
4. LK to select **DIRECTION** → SK to **000-359°** → Press **ENTER**
Diamond on screen indicates another page is available
5. SK to **LEG LENGTH** → Press **SEL** → SK to **1.0 to 9.9 nm**
6. LK to **START SIDE** → SK to **LEFT/RIGHT** → Press **ENTER**
7. Press **ENTER** to activate / Press **[PAT]** to disable search pattern

EXPANDING SQUARE SEARCH

1. Press **SEL** → **INS? Flashes** → Press **ENTER**
2. **Choose wypt** → Press **ENTER**
3. LK to select **SPACING** → SK to **0.2 to 9.9 nm**
4. LK to select **DIRECTION** → SK to **000-359°** → Press **ENTER**
5. Press **ENTER** to activate / Press **[PAT]** to disable search pattern

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AIRCREW BRIEFING GUIDE

- This briefing should not take more than 10 minutes.
- All crewmembers MUST be present and participate.
- Occurs only after mission planning tasks are complete

ROLL CALL

1. Crew Introductions (as needed)
2. Currency / Crew Positions / Level of Experience
3. Check ID Cards and Documents (CAPID, CAPF101, FAA)
4. IMSAFE Checklist (everyone)
5. Crew Duty Day (current and remaining)
6. Uniforms correct and appropriate (“dressed to egress”)
7. Necessary equipment (survival gear, charts, camera, glasses, etc.)
8. Time Hack

MISSION TASKING

1. Mission Number / Sortie Number / Symbol
2. Objective / Target (“the successful outcome of this mission is ...”)
3. Grid Assignment / Search Area(s) / Altitude(s)
4. Mission Profile / Pattern to be flown (if specified in tasking)
5. Available Information (AFRCC Reports / NTAPs / Witnesses)
6. Mission Assets & Grid Assignments (Aircraft, Ground Teams)

FLIGHT PLANNING

1. Aircraft Tail Number / Call Sign
2. Aircraft Inspection Complete (CAPF-71)
3. Current / Forecast Weather Conditions
4. NOTAMs / TFRs / Special Local Procedures
5. Takeoff: Static / Rolling / Soft / Short
6. Navigational Plots: Current location, sortie AOR, route/grid
7. Departure: Routing / Altitude / Airspeed / ETE
8. Recovery: Routing / Altitude / Airspeed / Approach
9. Takeoff / Landing Performance
10. Fuel Requirements & BINGO data (compare to current fuel)
11. Weight & Balance (complete)
12. FAA Flight Plan (as required)

VISUAL SEARCH MISSION

REVIEW AS APPROPRIATE

1. Search Area (Grid / Route / etc.) – Lat/Long Coordinates (independently plot and compare)
2. Search Altitude (MSL/AGL)
3. Top Search Altitude
4. Track Spacing and Orientation (N-S or E-W)
5. Time in Transit (initial heading after takeoff)
6. Time on Station
7. Emergency Safe Altitude
8. Ingress / Egress Altitudes
9. Search Airspeed / Flap setting
10. Adjacent active grids
11. Turns inside grid vs. outside (gives observers a break)
12. Auxiliary Airfield Information Reviewed
13. GT Rendezvous Information on Communication Flimsy/Matrix
14. Visual scanning: don't look for intact aircraft – look for reflections, trash, burn marks, foliage discoloration, etc.

ELECTRONIC SEARCH MISSION

REVIEW AS APPROPRIATE

1. SARSAT Coordinates / Location and Altitude of reporting AC
2. Listen on Nav/Comm with Squelch off
3. Set Intensity on LPER or Becker
4. Set correct Mode / Frequency on Becker (Emergency vs Training)
5. Review methods: Radio DF (LPER/Becker), Aural, Wing Nulling, Pinpointing
6. Night / Limited Visibility: consider a wedge of airspace off navaid with DME defining boundaries
7. Brief Altitudes
8. Contact local law enforcement for ground support if no GT available

COMMUNICATIONS

1. Key Frequencies: Air-Air / Air-Ground
2. Key Telephone Numbers
3. Call signs
4. Recall Codewords and meanings
5. Check-in times (use a timer). Provide OpsNormal with location
6. Reporting events: Engine Start, Wheels Up, In Grid, RTB, Wheels Down, Engine Stop, Ops Normal (others as required)
7. Highbird / relay procedures
8. Ground Team Coordination or local law enforcement for remote missions without GT support
9. Roles & Responsibilities: who is responsible for what
10. Procedures: who is running which radio
11. Comm Matrix/Flimsy Complete

CREW RESOURCE MANAGEMENT / DUTIES

1. MP flies the plane and is not a scanner
2. MO Equipment & Duties (scan, clearing, radios, nav, ops log)
3. MS Equipment & Duties (look, clear, scan, log, imaging)
4. GPS, Avionics, and Radios – roles & responsibilities
5. Everyone has a voice, PIC is final authority for safety of flight
6. Crew comfort needs: speak up
7. Sterile Cockpit in Critical Phases of Flight

EMERGENCIES

1. Maintain positive aircraft control – climb if possible
2. Critical: Engine Failure – Land
3. Non-critical: Climb and work it out
4. MP Flies, MO runs the checklist, MS clears for hazards
5. Birdstrike: Both on Controls and Climb
6. Controllability check: If structurally damaged
7. Engine Failure: Crash Position / Open Doors / ELT Operation
8. Egress: MO grabs fire extinguisher, MS exits Pilot's side (Seat forward) OR Observer's door (seat aft), Avoid Prop, Meet at RP
9. Engine Fire on Start: Radio Call for Fire Trucks
10. Night Electrical Failure: MO spots the ASI with flashlight
11. Physiological Incident

SAFETY

1. Review Operational Risk Management Form
2. Seatbelts on at all times, door and seat belt operation
3. Oxygen use and system operation (if required)
4. Review Hazards Along Route: Birds, Aircraft, Airports, Aircraft Transitioning to other grids, IR/VR Routes, Victor Airways
5. Safe Altitude on Chart: Round up to 100 ft plus 100 ft margin; set minimum altitude for emergencies
6. Terrain: Mountains, Climbing Terrain, Towers, Overwater
7. Know and honor Ingress / Egress Altitudes
8. G1000 – Traffic Alerts and Terrain Warning turned on
9. ALL to call out uncorrected deviations from plan:
+/- 100ft altitude / 10 kts airspeed / ¼ mile from course
10. Review and define 'safe words' (anyone can say at any time):
"Knock it Off" / "This is stupid" – climb to safe alt immediately and discuss whether to continue sortie
"Go Around" (during landing) initiate immediate go around
"I Want to go Home" – terminate sortie and RTB
11. Two Challenge Rule (only if two pilots on board)
12. Positive Aircraft Control (and transferring between pilots)
13. MO/MS call traffic "on the clock"
14. Discuss: Airsickness, Dehydration, Hypoxia, and Fatigue
15. Remove rings, jewelry, and scarves

REQUIRED EQUIPMENT

1. Aircraft documents and Keys
2. Checklists
3. Flight Pubs (current & as required): sectionals / charts, approach plates, nav, comm. Logs, gazetteer, gridded sectionals, AFD
4. Survival gear (personal & aircraft): status and location
5. Personal Equipment: Headset, kneeboard, pen, plotter, E6B, flashlight, sunglasses
6. Camera
 - Operational & correct settings (verify date/time)
 - Battery State & Memory card (reformat card)
 - Extra supplies (batteries and memory card)
7. Water and Snacks

EMERGENCY PROCEDURES REVIEW

- Review before first mission of the day

SURVIVAL
1. Personal / Aircraft Equipment Review
2. Most important: Will to survive / Positive Mental Attitude
3. First actions after crash: Triage injuries and Render First Aid
4. Treat for Shock (water)
5. If remote, stay with aircraft
6. Activate ELT or PLB
7. Assess immediate needs: Shelter, Warmth, Water, Food
8. Signal: Fire, Mirror, Signal Panel, Electronic, Ground Signals

EMERGENCY OF THE DAY	
<i>Select the calendar day of the month and briefly discuss your actions</i>	
1. Engine Fire During Start	17. Forced Landing
2. Lost Gas Cap in Flight	18. Flaps Fail to Extend
3. Inadvertent IMC	19. Airspeed Failure
4. Electrical Failure at Night	20. Engine Roughness
5. Pitot / Static Failure	21. Electrical Fire in Flight
6. Vacuum Failure	22. Vibration in Flight
7. Engine Fire in Flight	23. Abort (Rejected Takeoff)
8. Bird Strike	24. Loss of Oil Pressure
9. Engine Failure after Takeoff	25. Engine Temp Failure
10. Carbon Monoxide Poisoning	26. Low Vacuum
11. Elevator Locks in Flight	27. Ear Blockage / Physiological
12. Hypoxia	28. Power Loss
13. Ditching (Water)	29. Thunderstorms
14. Turbulence Penetration	30. Lost Procedures
15. Carb Icing (if relevant)	31 Radio Failure
16. Fuel Starvation	

QUESTIONS?

AIRCREW PREFLIGHT RESPONSIBILITIES

EQUIPMENT INSPECTION

- | | |
|-------------|---|
| 1. Crew | Flight gear under wing, your side of aircraft |
| 2. Observer | Aircraft – UNTIE |
| 3. Observer | Pitot tube cover – REMOVE |
| 4. Observer | Chocks – REMOVE |
| 5. Scanner | Survival gear – INSPECT (aircraft and personal) |
| 6. Scanner | Survival gear – PLACE within reach if 2-person crew |
| 7. Scanner | Baggage area items – INSPECT and TIE DOWN |
| 8. Crew | ELT receiver antennas – VERIFY LOCATION |

CREW WALK-AROUND INSPECTION (NOTIFY PILOT IF DEFICIENCY FOUND)

- | | |
|------------------------------|---|
| 1. Baggage door – SECURE | |
| 2. Left fuselage – INSPECT | (no wrinkles in skin, antennas secure) |
| 3. Left elevator – INSPECT | (no significant dents) |
| 4. Rudder – INSPECT | (no significant dents, VOR antenna present) |
| 5. Right elevator – INSPECT | (no significant dents) |
| 6. Right fuselage – INSPECT | (no wrinkles in skin) |
| 7. Right wing – INSPECT | (no significant dents) |
| 8. Right main gear – INSPECT | (no leaks, bald spots) |
| 9. Pitot tube – INSPECT | (no cracks) |
| 10. Nose wheel – INSPECT | (no bald spots, two fingers of inflation) |
| 11. Windshield – CLEAN | |
| 12. Propeller – INSPECT | (no significant burs) |
| 13. Left wing – INSPECT | (no significant dents) |
| 14. Left main gear – INSPECT | (no leaks, bald spots) |

INTERIOR EQUIPMENT INSPECTION & ENGINE START

- | | |
|-------------|--|
| 1. Crew | Headset – PLUGGED IN |
| 2. Crew | Flight log – RECORD Hobbs and tach times |
| 3. Crew | Charts – PREPARED (folded open to flight area) |
| 4. Observer | Before Start Checklist – READ (challenge-response) |
| 5. Observer | Radios – SET |
| 6. Crew | Area – CLEAR of traffic |

AIRCREW RESPONSIBILITIES – FLIGHT OPERATIONS

OBSERVER RUN-UP CHECKLIST

1. Audio panel – SET as desired
2. COM radio – SET to briefed frequencies, per pilot approval
3. ELT receiver – SET to 121.5 or 121.775 and **run checklist**
4. GPS – PROGRAM and run checklist
5. ADF – SET to NDB nearest to search
6. VOR – SET to two nearest to search
7. FM radio – SET to briefed frequency
8. FM radio – CHECK with mission base
9. Transponder – SET to 1200, 1277 (real SAR) or as ATC assigned

BEFORE TAKEOFF

1. Observer Before Takeoff Checklist – READ (challenge-response)
2. Scanner Area – CHECK for traffic
3. Crew Traffic – ANNOUNCE nearby traffic

CRUISE

1. Observer Mission base – CONTACT (wheels up time, # crew)
2. Crew Situational awareness – MAINTAIN
Traffic – ANNOUNCE

BEFORE LANDING

1. Observer ATIS/AWOS – OBTAIN
2. Crew Seatbelt/harness – SECURE
3. Crew Mission gear – SECURE
4. Crew Traffic – SCAN
5. Scanner Traffic – MAINTAIN visual contact

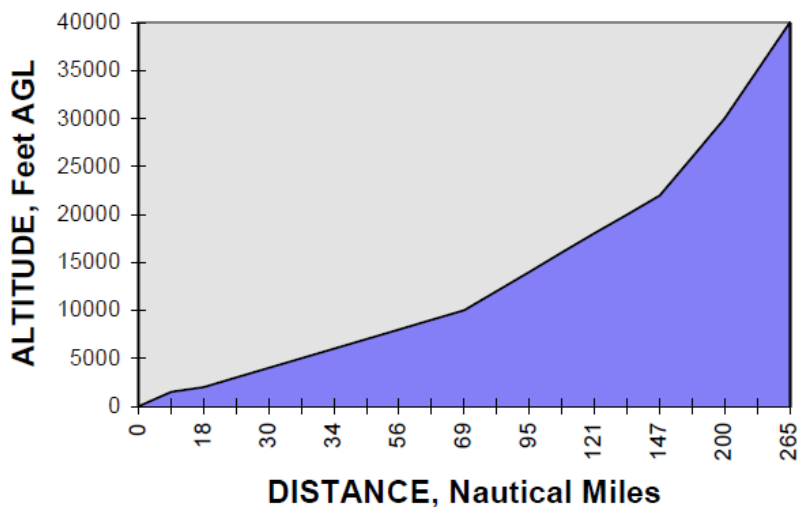
AFTER LANDING

1. Crew Area – ANNOUNCE clear
2. Observer Mission base – CONTACT (wheels down time)
3. Crew Aircraft – EXIT (remove personal gear)
4. Crew Flight log – RECORD Hobbs and tach times
5. Crew Aircraft – TIE DOWN
6. Crew Seat belts – SECURED
7. Scanner Non-mission gear – RETURNED to aircraft
8. Crew Flight plan – CLOSE
9. Crew Flight – DEBRIEF

USAF CREW RESOURCE MANAGEMENT SCORECARD

CRM SKILL	POSITIVE FACTORS	NEGATIVE FACTORS
Mission Planning Brief	Organize; clearly assesses and defines mission, environment, aircraft and situation, covers contingencies	Neglects, rushed, incomplete, vague, lectures, ignores
Situational Awareness	Anticipates, monitors, prevents loss, recognizes own/other's loss, regains	Disoriented, confused, lost, fixated
Crew Coordination and Flight Integrity	Leads, identifies roles and expectations, sets tone, respects, encourages, assertive	Judges, ridicules, overreacts, ignores, imposes, accepts error
Communication	Clear, concise, listens, interprets, efficient, gets or gives feedback	Interrupts, withholds, discounts, ambiguous, mumbles
Task Management	Prioritizes, assigns tasks, creates time, plans, delegates, checklist discipline	Rushed, overloaded, complacent, mis-prioritizes
Risk Management & Decision Making	Identifies and assesses problems, explores solutions, makes appropriate decisions	Avoids, delays, vacillates, argues, fails to consider consequences of decision
Debrief	Objective through feedback, non-threatening, recaps key points, solicits inputs, provides corrective action	Rushed, incomplete, vague, lectures, blames, ignores

ELT RECEPTION DISTANCE



ALTITUDE FT AGL	DISTANCE NM
1500	16
2000	18
3000	26
4000	30
5000	32
6000	34
7000	44
8000	56
9000	63
10000	69

ALTITUDE FT AGL	DISTANCE NM
12000	82
14000	95
16000	108
18000	121
20000	133
22000	147
26000	174
30000	200
35000	232
40000	265

ELT RECEPTION DISTANCE GRAPH & TABLE

Note: these are maximum theoretical detection values; actual distances will vary based on terrain, atmospheric conditions, and radio sensitivity

Becker 517 / Rhotheta RT-600 DF Range Chart

BECKER SAR DF-517

ALTITUDE <small>(Feet AGL above transmitter)</small>	Range from PELT 20NM	Range from PELT 15NM	Range from PELT 10NM	Range from PELT 5NM	Range from PELT 3NM	Range from PELT 2NM	Range from PELT 1NM
	% Signal Strength	% Signal Strength	% Signal Strength	% Signal Strength	% Signal Strength	% Signal Strength	% Signal Strength
7,500	31%	33%	36%	45%	51%	54%	52%
5,000	30%	32%	35%	45%	51%	55%	61%
2,500	No Signal	30%	33%	39%	47%	52%	62%
1,500	No Signal	No Signal	29%	35%	42%	46%	56%

Table devised from flight testing with Pointer Cadet 6000 PELT on 121.775 in flat open area.

PELT output is 150mw with sweep tone.

Becker receiver unit DCU RT-500, firmware version 2.04, Antenna Unit Version 2.1

Baseline with no signal present = 27% signal strength indication, Max = 95% with PELT next to AU

BECKER SAR-DF-517 / RTHETA RT-600 PROCEDURES

POWER-UP

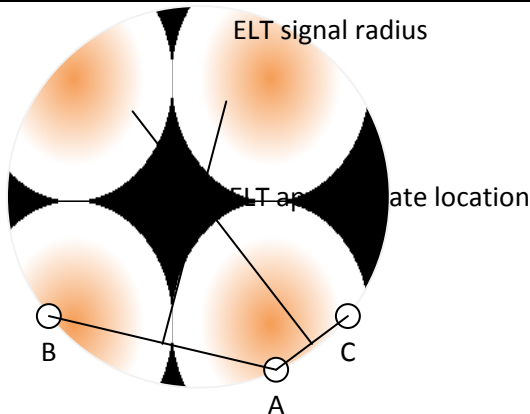
11. Aircraft Master power – ON / Avionics 1 & 2 – ON
12. Mission Master power – ON / DF Unit power - ON
13. **Becker 517:** Select mode (Training or Emergency) using **PAGE**
14. **Frequency** – SET using lower right knob (Training: 121.775)
Scan: Automatically monitors 121.5, 243, 406 range
15. **Brightness** – ADJUST as needed. Press **REP** and turn **PAGE** knob
16. **Becker 517:** Tracking Page Mode (360°/90°/ or Text Bearing)
17. Page – SET as desired using Page knob
 - a. SAR-DF 517: Page 1, 360° mode
 - b. RT-600: DF page
18. Volume – SET as desired using lower left knob
19. Squelch – SET to above noise level
20. Audio panel – PRESS ADF or AUX to monitor signal

TRACKING A SIGNAL

9. Direct course changes using displayed **relative bearing** to current aircraft heading; it is not a true course
10. Maneuver aircraft so bearing is +/- 5°
11. **Becker 517:** Set to 90° for greater sensitivity close to source
12. **Squelch** – REDUCE to lower level, below 50%
13. **G1000 MFD** – select NAV MAP (PRESS CLR for 2 sec)
14. **Mark Position** when source bearing flips (aircraft has passed it)
PRESS RANGE knob and then **ENT** to save
15. **Repeat passes** as necessary to improve precision of fix
16. Crew – **TRANSITION to visual search**

ELT SEARCH PROCEDURE – AURAL

1.	COM radio – SET to 121.5 or 121.775
2.	Volume – SET and do not adjust
3.	Observer Lat/Long – RECORD when signal heard
4.	Observer Time – RECORD
5.	Scanner Lat/Long – PLOT on chart as Point A
6.	Pilot Heading – MAINTAIN for 3 minutes
7.	Observer Time – ANNOUNCE 3 minutes elapsed
8.	Pilot Heading – TURN 90 degrees left or right
9.	Crew Signal – ANNOUNCE when signal fades
10.	Observer Lat/Long – RECORD when last crew member announces loss of signal
11.	Scanner Lat/Long – PLOT on chart as Point B
12.	Pilot Heading – TURN 180 degrees
13.	Crew Signal – ANNOUNCE when signal fades
14.	Observer Lat/Long – RECORD when last crew member announces loss of signal
15.	Scanner Lat/Long – PLOT on chart as Point C
16.	Scanner Draw lines between points A & B and A & C
17.	Scanner Draw lines at the midpoint of and perpendicular to AB and AC
18.	Scanner Lat/Long – PLOT location of intersection of lines – ELT should be near that location



ELT SEARCH PROCEDURE – WING NULL

1.	COM radio	– SET to 121.5 or 121.775
2.	Observer	Lat/Long – RECORD
3.	Scanner	Lat/Long – PLOT on chart
4.	Pilot	STEEP TURN – Make two 360° turns at 45°-60° bank
5.	Pilot	Altitude – MAINTAIN
6.	Observer	Heading indicator – MONITOR
7.	Crew	Signal – ANNOUNCE when signal fades
8.	Observer	Heading – RECORD
9.	Scanner	Heading – ADD/SUBTRACT 90° based on COM antenna position and direction of turn to get heading to ELT*
10.	Scanner	Heading – PLOT line on chart from marked lat/Long (convert from magnetic degrees to true/grid)
11.	Pilot	Heading – TURN to Observer's recorded heading (perpendicular to heading to ELT)
12.	Pilot	Fly 5 nm
13.	Crew	Repeat steps 2-10
14.	Scanner	Lat/Long – PLOT location of intersection of lines – ELT should be near that location

* ELT Heading – LEFT TURN

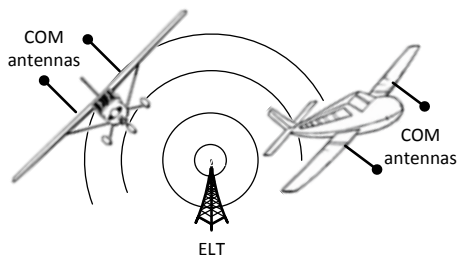
COM antenna above wings – ADD 90°

COM antenna below wings – SUBTRACT 90°

*ELT Heading – RIGHT TURN

COM antenna above wings – SUBTRACT 90°

COM antenna below wings – ADD 90°



**GENERAL RULE OF THUMB FOR ANTENNAE ABOVE THE WINGS:
HIGH WING POINTS TO ELT**

ELT SEARCH PROCEDURE – SIGNAL PINPOINTING

1. Observer Sensitivity – REDUCE
2. Observer Frequency – CHANGE incrementally from 121.5
3. Crew Transition to visual search

SIGNAL DROPOUT

1. Observer Lat/Long – RECORD
2. Pilot Heading – MAINTAIN for 3 minutes
3. Pilot Altitude – CLIMB 1000' if signal not reacquired
4. Pilot Heading – MAINTAIN
5. Observer Sensitivity – INCREASE if needed to reacquire

CONE OF SILENCE

1. Volume – Will be loud approaching the station
2. DF needle – Will waiver / hunt
3. Volume – Will drop
4. Strength – Will drop
5. Frequency – Detune from 121.5 as described above
6. Altitude – DESCEND

AFRCC REQUIRED ELT INFORMATION

AFRCC requires specific data to be reported for each ELT/EPIRB that is found and silenced. Collect as much as you can and report it on your CAPF104 or to IC as directed.

1. Time (Zulu) that the ELT/EIPIRB was first heard
2. Time (Zulu) that the objective/ELT/EPIRB was located
3. Time (Zulu) that the ELT/EPIRB was silenced
4. Street address where the ELT/EPIRB was located
5. Lat/Long (in degrees and minutes) where beacon was located
6. Type of airplane or boat that contained the ELT/EPIRB
7. "N" number / hull number of the airplane or boat
8. *ELT/EPIRB manufacturer
9. *Model number of the ELT/EPIRB
10. *Serial number of the ELT/EPIRB
11. *Battery expiration date of the ELT/EPIRB
12. *Name/Address/Phone# of the ELT/EPIRB owner
13. *Cause of activation (mishandling, damaged, hard landing, etc.)

** If information can be safely and legally obtained*

Maximum Area of Possibility: Circular area (normally) centered at the target's last known position (LKP), corrected for wind. Circle's radius represents the max distance a missing AC might have flown based on estimated fuel endurance and corrected for the effects of wind over that same amount of time. Radius may also represent the max distance survivors might have traveled on foot, corrected for environmental or topographical conditions such as snow, wind, mountains, or rivers.

Probability Area: Smaller area with the MPA where (in the judgement of the IC or planners) there is increased likelihood of locating the target. Distress signals, sightings, radar forensics, and the flight plan are typical factors that help define the PA boundaries.

Search Altitude: Altitude (AGL) at which the search AC will conduct operations.

Track Spacing (S): Distance between adjacent visual or electronic search flight legs.

Probability of Detection: Likelihood (expressed as a percent) that a search AC my located objective. POD can be affected by weather, terrain, vegetation, lighting, and the skill of the crew, among other factors. When planning search missions, select an altitude and track spacing that increases POD, consistent with the flight conditions, regulations, aircrew experience, and most importantly – safety.

Meteorological Visibility: Max range at which a large object (e.g. a mountain) can be seen.

Search Visibility: distance at which a car-size object on the ground can be recognized. Search visibility is always less than meteorological visibility

Scanning Range: lateral distance from the scanner's aircraft to an imaginary line on the ground, parallel to the search aircraft's ground track. Within the area formed by the ground track and scanning range, the scanner is expected to have a good chance at spotting the objective.

Ground Track: imaginary swath across the surface or ground. Dimensions are formed by the scanning range and the length of the AC's ground track.

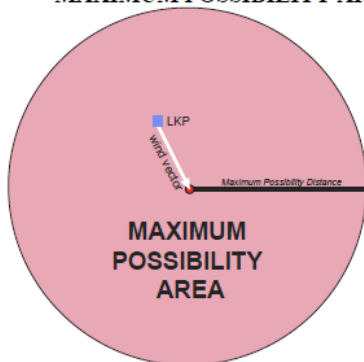
Track Spacing: distance between adjacent ground tracks. The idea here is for each search track to either touch or slightly overlap the previous one. It is the pilot's task to navigate so that the AC's ground track develops proper track spacing.

Possibility Area: area drawn on a map with its focus at the last known position (LKP) of the target. Many factors are considered before establishing a possibility area, but it is the largest geographic area in which the target may be found.

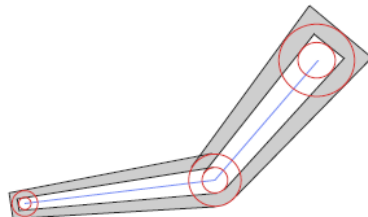
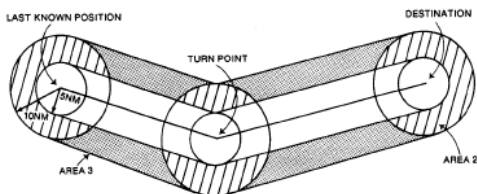
Probability Area: geographic area within which the target is most likely to be found.

POSSIBILITY / PROBABILITY & POSSIBILITY VS PROBABILITY

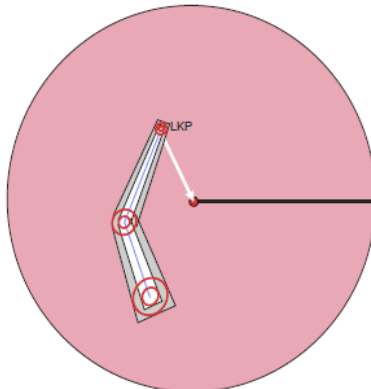
MAXIMUM POSSIBILITY AREA



PROBABILITY AREAS



POSSIBILITY VERSUS PROBABILITY



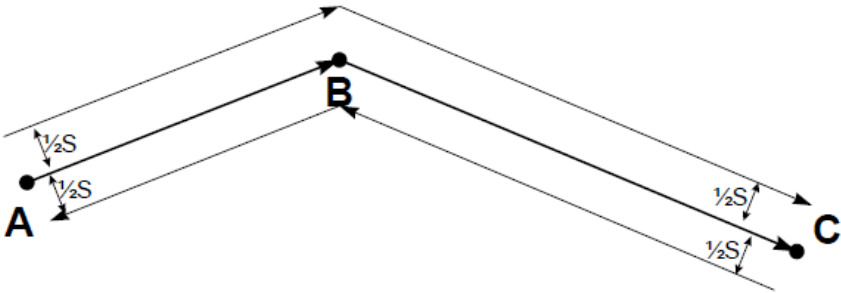
VISUAL SEARCH PATTERNS – PLANNING CONSIDERATIONS

- The Controlling Obstacle within the Search Area (highest terrain or tallest man-made obstruction)
- Ingree-Egree Coordinated Altitudes (to avoid other search traffic)
- Plan to place the Scanner on the side of the AC opposite the sun for best chance of reflections
- Utilize the Lat-Long **NUMBERS** on the GPS to fly the N-S search lines
- Keep the **SAME** Longitude number on the GPS to fly the N-S track
- To correct the track shown, fly **WEST** to increase Longitude; fly **NORTH** to increase Latitude
- At 90 kts, turning just under Standard Rate will yield approx $\frac{1}{4}$ NM turn radius which results in $\frac{1}{2}$ NM spacing.

ROUTE SEARCH (TRACK LINE OR TRACK CRAWL)

USE: When objective AC is missing without additional clues but origin and destination is known. Assumes AC went down near probable or intended route of flight. Can be used at night, when aided by survivor signals or an ELT. Can also help determine radar coverage for use with NTAPs. It is an excellent first-response search.

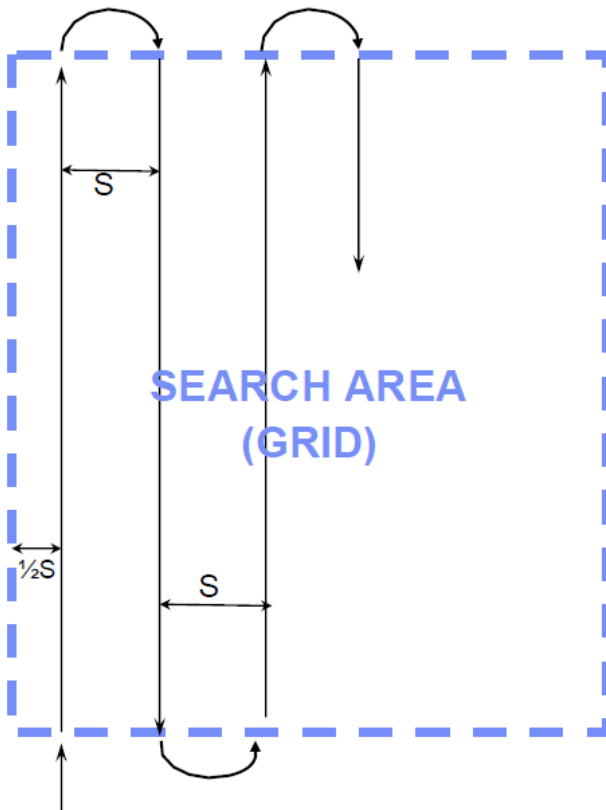
EXECUTION: flown at a track spacing S around the route of flight or directly over the route of flight.



PARALLEL LINE / GRID SEARCH

USE: when the search area is large and fairly level, uniform coverage is desired, and only the approximate location of the target is known.

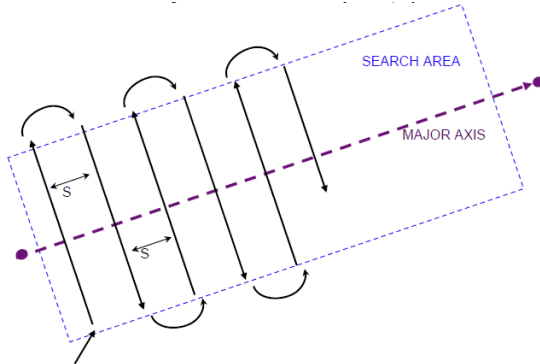
EXECUTION: complete survey of grid corners and agree as crew what the visual boundaries of the grid are. Begin at one corner of search area and fly at assigned altitude. Fly first leg at $\frac{1}{2}$ desired spacing (S) from border. Use GPS for accurate coverage. Legs can be East-West or North-South; consult your IC or AOB for desired method(s). Use appropriate track spacing based on foliage and terrain; $\frac{1}{4}$ NM spacing recommended for heavily-wooded areas. Turns can be either inside or outside of the grid. **Outside** of the grid is preferred to allow for frequent short crew breaks and to allow for uniform search coverage. Determine whether there are aircraft operating in adjacent grid(s) and monitor in flight to determine whether grids become active.



CREEPING LING SEARCH

USE: (1) when the Search Area is narrow, long, and fairly level, (2) the probable target location is thought to be on either side of the track between two points, and (3) immediate coverage of the most probable area followed by rapid advancement of successive search legs along the track is desired.

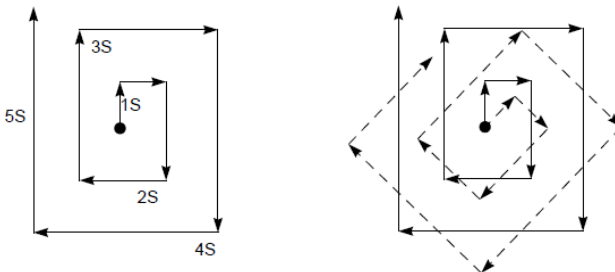
EXECUTION: Fly the creeping line similar to the Parallel Search but make the search legs back and forth across the major axis (usually the target's intended route of flight).



EXPANDING SQUARE SEARCH

USE: when the approximate position of the target and/or survivors is known.

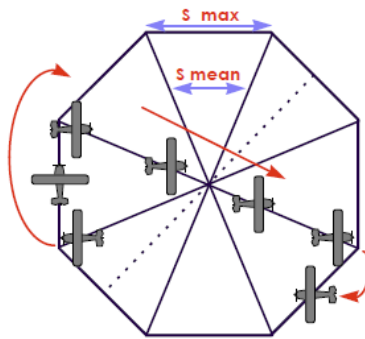
EXECUTION: Very precise pattern, requiring excellent navigation. Entire pattern and frequency of turns is based on Track Spacing (S). The most accurate execution of this pattern requires GPS. Timing can be used to replace distance (S) for less-accurate quick searches, example: fly 1 minutes for legs of $1S$, 2 minutes for $2S$, etc. If a second pattern is flown, fly at a 45° angle to the first pattern.



SECTOR SEARCH

USE: when the approximate position of the target and/or survivors is known. (1) Provides concentrated coverage near the center of the search area, (2) easier to fly than the Expanding Square pattern, and (3) provides the opportunity to view the suspected area from many angles minimizing terrain and lighting problems.

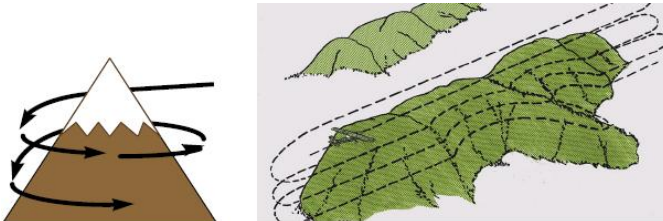
EXECUTION: Due to the complexity of the pattern (multiple headings, precise leg lengths, etc.) should be planned on the ground in advance. Pilot will overfly suspected location and out far enough to make a turn. Fly a leg that is equal to the maximum Track Spacing (S), then turn back to fly over the point again. Pattern continues until the point has been crossed from all the angles shown below.



CONTOUR SEARCH

USE: when sharp changes in elevation make other search patterns impracticable. Allows mountain slopes and valleys to be searched thoroughly. **Mission Pilot must be Mountain Flight Certified (MFC) to operate in mountainous terrain** (check CAPF101).

EXECUTION: Fly high to low – fly down canyons and elevation, **not up!** Thorough pre-flight planning (WX and terrain analysis) must be conducted. Perform thorough survey at safe altitude prior to descending to search altitude – have an egress plan (box canyons eat airplanes). Use correct technique for benches and plateaus.



SEARCH TURN RADIUS

Visual search operations require frequent 180° turns. For practicality and ease of navigation, North-South searches are often flown on even minutes of longitude. In this case we approximate track spacing (S) as 1 NM (usually smaller). The further North we go, the closer lines of longitude become. Flying East-West legs on the minute lines are always 1 NM apart, resulting in a turn radius of ½ NM (last table).

The following tables were developed using the equations below. *D* is the distance in NM between minute lines of longitude, *R* is the turn radius to fly from *D* one minute to another, *V* is the velocity as TAS, and θ (theta) is the bank angle that corresponds to the turn radius. The tables below **do not account for wind**.

Example: a C-182 is flying a N-S grid search at approx 90 KTAS and 45° Latitude. The turn radius is 0.35 NM, the distance between minute lines of longitude is of 0.71 NM, which equates to a no-wind bank angle of 19° from one leg to another.

$$DIST(D) \approx \cos(latitude)$$

$$RADIUS(R) \approx \frac{\cos(latitude)}{2}$$

$$RADIUS(R) = \frac{V^2}{11.26 \times \tan \theta}$$

$$BANK\ ANGLE(\theta) = \arctan\left(\frac{V^2}{R \times 11.26}\right)$$

Latitude : **35°**
 Radius: 0.41
 NM / Dia. 0.82

TAS	BANK
80	13°
90	16°
100	20°
110	23°
120	27°
130	31°
140	35°

Latitude : **37°**
 Radius: 0.40
 NM / Dia. 0.80

TAS	BANK
80	13°
90	17°
100	20°
110	24°
120	28°
130	32°
140	36°

Latitude : **39°**
 Radius: 0.39
 NM / Dia. 0.78

TAS	BANK
80	14°
90	17°
100	21°
110	24°
120	28°
130	32°
140	36°

Latitude : **41°**
 Radius: 0.38
 NM / Dia. 0.75

TAS	BANK
80	14°
90	17°
100	21°
110	25°
120	29°
130	33°
140	37°

Latitude : **43°**
 Radius: 0.37
 NM / Dia. 0.73

TAS	BANK
80	14°
90	18°
100	22°
110	26°
120	30°
130	34°
140	38°

Latitude : **45°**
 Radius: 0.35
 NM / Dia. 0.71

TAS	BANK
80	15°
90	19°
100	22°
110	27°
120	31°
130	35°
140	39°

Latitude : **47°**
 Radius: 0.34
 NM / Dia. 0.68

TAS	BANK
80	15°
90	19°
100	23°
110	27°
120	32°
130	36°
140	40°

Latitude : **ALL**
 Radius: 0.50
 E-W Leg 1.00

TAS	BANK
80	11°
90	13°
100	16°
110	19°
120	23°
130	26°
140	30°

PROBABILITY OF DETECTION: MISSION AND CUMULATIVE

MISSION POD CHART

OPEN, FLAT TERRAIN					MODERATE TREE COVER/HILLY					HEAVY TREE COVER/VERY HILLY				
Srch Alt. (AGL)	Search Visibility				Srch Alt. (AGL)	Search Visibility				Srch Alt. (AGL)	Search Visibility			
	Track Spacing	1 mi	2 mi	3 mi		4 mi	Track Spacing	1 mi	2 mi		3 mi	4 mi	Track Spacing	1 mi
500 ft					500 ft					500 ft				
0.5 mi	35%	60%	75%	75%	0.5 mi	20%	35%	50%	50%	0.5 mi	10%	20%	30%	30%
1.0	20	35	50	50	1.0	10	20	30	30	1.0	5	10	15	15
1.5	15	25	35	40	1.5	5	15	20	20	1.5	5	5	10	15
2.0	10	20	30	30	2.0	5	10	15	15	2.0	5	5	10	10
700 ft					700 ft					700 ft				
0.5 mi	40%	60%	75%	80%	0.5 mi	20%	35%	50%	55%	0.5 mi	10%	30%	30%	35%
1.0	20	35	50	55	1.0	10	20	30	35	1.0	5	10	15	20
1.5	15	25	40	40	1.5	10	15	20	25	1.5	5	5	10	15
2.0	10	20	30	35	2.0	5	10	15	20	2.0	5	5	10	10
1000 ft					1000 ft					1000 ft				
0.5 mi	40%	65%	80%	58%	0.5 mi	25%	40%	55%	60%	0.5 mi	40%	60%	75%	80%
1.0	20	40	55	60	1.0	15	20	30	35	1.0	5	10	15	20
1.5	15	30	40	45	1.5	10	15	20	25	1.5	5	10	10	15
2.0	15	20	30	35	2.0	5	10	15	20	2.0	5	5	10	10

Previous, or Cumulative POD		CUMULATIVE POD CHART									
5-10%	15										
11-20%	20	25									
21-30%	30	35	45								
31-40%	40	45	50	60							
41-50%	50	55	60	65	70						
51-60%	60	65	65	70	75	80					
61-70%	70	70	75	80	80	85	90				
71-80%	80	80	80	85	85	90	90	95			
80% +	85	85	90	90	90	95	95	95	95	95	95+
	5-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	80% +		
- POD THIS SEARCH -											

AERIAL PHOTOGRAPHY CAMERA CHECKLIST

STARTUP – BEFORE LEAVING GROUND

1. **Memory Card** – VERIFY INSTALLED and SPACE AVAILABLE
2. **Battery** – VERIFY POWER REMAINING
3. **Image Size/Format** – SET for JPEG, Highest Quality
4. **Date/Time** – SET TIME and DATE (LOCAL or ZULU as required)
5. **Camera Focus** – SET for MANUAL
6. **Mode** – SET for PICTURE (priority as required)
7. **Sleep Mode** – SET for LONGEST DELAY
8. **Flash Mode** – SET for MANUAL or TURN OFF
9. **Other Settings** – VERIFY ALL SETTINGS AS NEEDED FOR MISSION
10. **Crew Briefing** – DISCUSS with MP and MO how you will communicate aircraft positioning requests
11. **Practice Photo** – take photo of aircraft or crew prior to engine start as final check of equipment

TAKEOFF

1. Take picture of runway on departure (time stamp as reference for all other images from sortie)

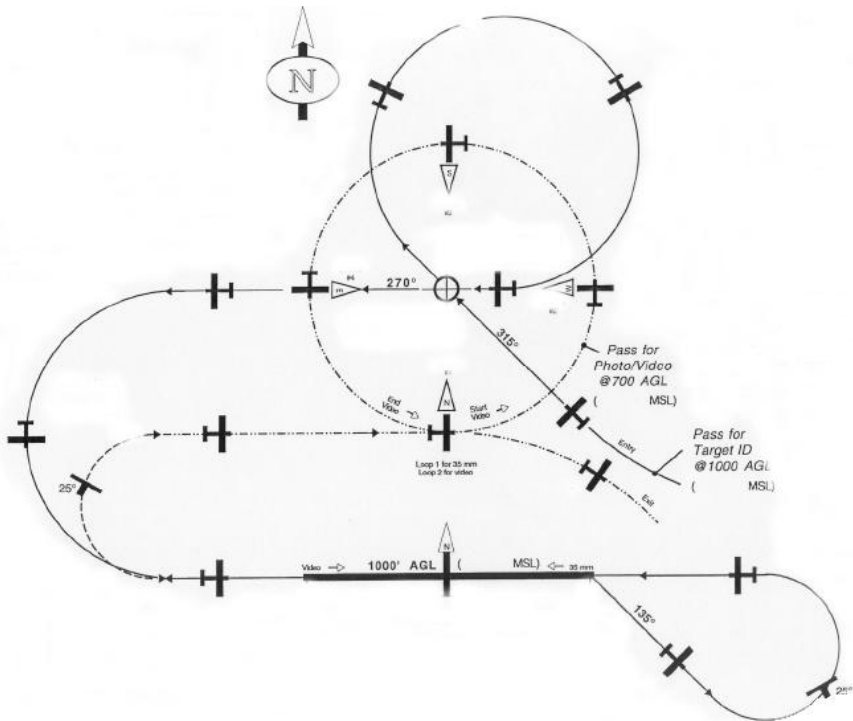
ENROUTE TO GRID/OBJECTIVE

1. Take practice shots – several practice shots and review on camera to verify settings are compatible with lighting conditions
2. Confirm with MO – GPS is set as necessary to record Lat/Long
3. Photo Log – VERIFY READY (both MO and MS) to record for each image:
 - a. Objective
 - b. Time on Target
 - c. Position (Lat/Long)
 - d. Heading
 - e. Altitude

IN GRID / ON OBJECTIVE

1. Follow prescribed method of taking images
2. Take many images (including duplicates) of target: plenty of memory and it is cheaper than avgas
3. Crew works together to log images
4. MP – Flies the plane. MS/AP is in charge of directing MP to position for needed imagery

PHOTO MISSION FLIGHT PROFILE (SUGGESTED)



1. MP flies the plane to minimize target fixation
2. AP captures photographs from cardinal points (or as directed by customer) or continuous video.
3. MO records log

GROUND TEAM MANEUVER PROCEDURES

PREFLIGHT COORDINATION

1. Record GT frequency, call sign
2. Plan with GT Leader
 - a. Link-up time and location (identifiable from ground and air)
 - b. Common map to operate from (e.g. DeLorme)
 - c. GT vehicle roof marking

IN-FLIGHT MANEUVERING OF GT VEHICLE

5. Establish positive communications
6. Begin GT movement to target grid
7. Maneuver GT to link-up point
8. Positively identify GT vehicle
9. Move GT vehicle from known location to known location
10. Maneuver GT vehicle from intersection to intersection, giving backstops (known locations where GT should stop if reached)
11. Use state gazetteer or highway map

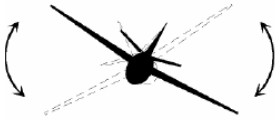
MANEUVER OF DISMOUNTED GT

4. Establish positive communications
5. Positively identify GT location
6. Have GT use signal mirror to show location after moving
7. Maneuver GT using cardinal directions to known locations
8. Use CA state gazetteer or highway map

AIR-GROUND LOST COMMUNICATIONS (NO RADIO)

1. GT will signal comm failure by stopping (Day)
2. GT will signal comm failure turn off headlights and activate flashers (Night)
3. GT will turn in direction of AC at intersections
4. GT will monitor 122.775 on LPER as backup
5. GT will wave for message received (Day)
6. GT will flash headlights for message received (Night)
7. AC will flash landing light indicating message received

AIR TO GROUND VISUAL SIGNALS



a. Message received and understood



b. Message received but NOT understood



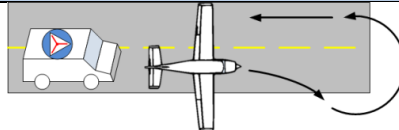
c. Yes or affirmative



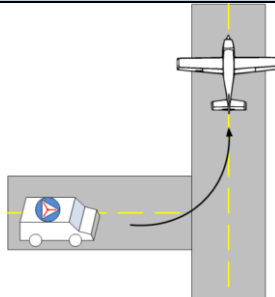
d. No or negative

GROUND TEAM MANEUVERS

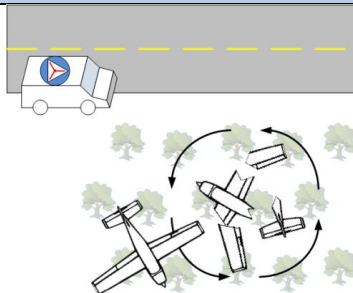
TURNING A GROUND TEAM AROUND



TURNING A GROUND TEAM AT AN INTERSECTION





IDENTIFYING TARGET LOCATION



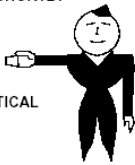
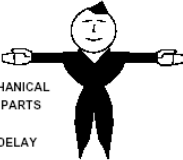




SURFACE TO AIR VISUAL SIGNALS

BRUSH SIGNALS






Require Assistance	V	Aircraft Seriously Damaged	
Require Medical Assistance or Unable to Proceed (old)	X	Operation Completed	LLL
No or Negative	N	We Have Found All Missing Personnel	LL
Yes or Affirmative	Y	All Well	LL
Proceeding In This Direction	↑	Require Fuel & Oil	L
We Have Found Only Some Missing Personnel	++	Not Understood	JL
We are not able to continue. Returning to base.	XX	Require Map & Compass	□
Have divided into two groups. Each proceeding in direction indicated.		Require Signal Lamp	
Information received that aircraft is in this direction	→→	Will Attempt Takeoff	▷
Require Doctor Serious Injuries	I	Nothing found. Will continue to search	NN
Require Medical Supplies	II	Require Firearm & Ammunition	V V
Require Food & Water	F	Require Engineer (old) Need Repairs	W
Indicate Direction to Proceed	K	Probably Safe To Land Here	△
		International Symbol of Distress	SOS

BODY SIGNALS

<p>NEED MEDICAL ASSISTANCE URGENT USED ONLY WHEN LIFE IS AT STAKE</p> 	<p>ALL OK DO NOT WAIT</p> 	<p>CAN PROCEED SHORTLY WAIT IF PRACTICAL</p> 
LIE SUPINE	WAVE ONE ARM OVERHEAD	ONE ARM HORIZONTAL
<p>NEED MECHANICAL HELP OR PARTS LONG DELAY</p> 	<p>DO NOT ATTEMPT TO LAND HERE</p> 	<p>LAND HERE</p> 
BOTH ARMS HORIZONTAL	BOTH ARMS WAVE ACROSS FACE	BOTH ARMS FORWARD HORIZONTALLY SQUATTING AND POINTING IN DIRECTION OF LANDING

SURFACE TO AIR VISUAL SIGNALS (CONT'D)

BODY SIGNALS (CONT'D)

 <p>USE MESSAGE DROP</p>	 <p>OUR RECEIVER IS OPERATING</p>	 <p>NEGATIVE (NO)</p>
MAKE THROWING MOTION	CUP HANDS OVERHEAD	CLOTH WAVED HORIZONTALLY
<p>AFFIRMATIVE (YES)</p> 	 <p>PICK US UP PLANE ABANDONED</p>	
CLOTH WAVED VERTICALLY	BOTH ARMS VERTICAL	

PAULIN (TARP) SIGNALS



ON LAND & AT SEA: PLANE FLYABLE, NEED TOOLS



ON LAND: WALKING IN THIS DIRECTION
AT SEA: DRIFTING



ON LAND: NEED QUININE OR ATABRINE
AT SEA: NEED SUN COVER



ON LAND: NEED WARM CLOTHING
AT SEA: NEED EXPOSURE SUIT OR CLOTHING INDICATED



ON LAND & AT SEA: NEED FIRST AID SUPPLIES



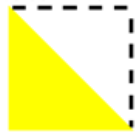
ON LAND & AT SEA: O.K. TO LAND. ARROW SHOWS LANDING DIRECTION



ON LAND: NEED GAS AND OIL, PLANE IS FLYABLE
AT SEA: N/A



ON LAND & AT SEA: NEED MEDICAL ATTENTION



ON LAND & AT SEA: NEED FOOD AND WATER



ON LAND & AT SEA: NEED EQUIPMENT AS INDICATED SIGNALS FOLLOW



ON LAND: INDICATE DIRECTION OF NEAREST CIVILIZATION
AT SEA: INDICATE DIRECTION OF RESCUE CRAFT



ON LAND: SHOULD WE WAIT FOR RESCUE PLANE?
AT SEA: NOTIFY RESCUE AGENCY OF MY POSITION



ON LAND & AT SEA: DO NOT ATTEMPT LANDING

KEY PHONE NUMBERS AND FREQUENCIES

Active SAR Aviation Band: 123.1 MHz	National CAP HQ ES/CD/DDR: (334) 953-4220
Practice SAR Aviation Band: 122.9 MHz	CAP Operations Fax Back: (334) 953-2599
AFRCC Missions Only: (800) 851-3051	AFRCC Tyndall AFB FL: (877) 430-0781
Emergency: 121.5 (Guard)	AFRCC Admin: (804) 764-8117
Time Hack: (202) 762-1401	Flight Service Station: 800-WX-BRIEF
General Flight Service: 122.2 MHz	FlightWatch (weather): 122.0 MHz

STANDARD TRANSPONDER SQUAWK CODES

VFR Training Operations / O-Rides / VFR Transport Missions	1200
SAR Missions (AFAM A1)	1277
Flight Following	Assigned by ATC – record
IFR Operations	Assigned by ATC – record
HLS Operations	Pre-determined Discrete Code
CD Operations	Pre-determined Discrete Code
Failed Radio (Lost Comms)	7600
Onboard Emergency	7700
“IDENT” – When directed by ATC, depress the IDENT button on the transponder once.	

COMMUNICATIONS FLIMSY

Use this checklist to gather all necessary comms information

AIRCRAFT TAIL NUMBER:	AIRCRAFT CALLSIGN:
MISSION BASE CALLSIGN:	MISSION BASE TELEPHONE:
MISSION BASE FREQUENCIES:	AIR-TO-AIR FREQUENCIES:
HIGHBIRD LOCATION:	OTHER AIRCRAFT CALLSIGNS:
GROUND TEAM FREQUENCIES:	GROUND TEAM CALLSIGNS:
GT VEHICLE DESCRIPTION:	GT RENDEZVOUS LOCATION:
GT RENDEZVOUS WINDOW:	GT PHONE NUMBER:
WING HQ PHONE NUMBER:	TIME HACK PHONE NUMBERS: (202) 762-1401 / (303) 499-7111
MISSION / SORTIE NUMBER:	AFRCC PHONE: (800) 851-3051

STANDARD LIGHTGUN SIGNALS (NO RADIO COMMUNICATIONS)

LIGHT PATTERN	ON GROUND	IN FLIGHT
Steady Green	CLEARED for Takeoff	CLEARED to Land
Flashing Green	Cleared to Taxi	RETURN for landing (to be followed by STEADY GREEN at proper time)
Steady Red	STOP	GIVE WAY to other aircraft and CONTINUE CIRCLING
Flashing Red	TAXI CLEAR of Landing Area/Runway in use	AIRPORT UNSAFE / DO NOT LAND
Flashing White	RETURN to starting point on airport	(Signal not used in flight)
Alternating Red and Green	EXERCISE EXTREME CAUTION	EXERCISE EXTREME CAUTION

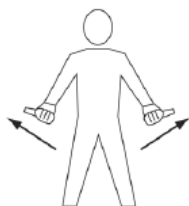
PHONETIC ALPHABET

Ltr	Morse	Phonetic	Said	Ltr	Morse	Phonetic	Said
A	·-·	ALFA	AL-FAH	S	···	SIERRA	SEE-AIR-AH
B	-···	BRAVO	BRAH-VOH	T	-	TANGO	TANG-GO
C	-·-·	CHARLIE	CHAR-LEE	U	··-	UNIFORM	YOU-NEE-FORM
D	··-	DELTA	DELL-TAH	V	···	VICTOR	VIK-TAH
E	·	ECHO	ECK-OH	W	··-	WHISKEY	WISS-KEY
F	···	FOXTROT	FOKS-TROT	X	-··	X-RAY	ECKS-RAY
G	-··	GOLF	GOLF	Y	-··	YANKEE	YANG-KEY
H	···	HOTEL	HOH-TEL	Z	-··	ZULU	ZOO-LOO
I	··	INDIA	IN-DEE-AH	0	-···	ZERO	ZEE-RO
J	-··-	JULIET	JEW-LEE-ETT	1	-···	ONE	WUN
K	-·-	KILO	KEY-LOH	2	···-	TWO	TOO
L	···	LIMA	LEE-MAH	3	···-	THREE	TREE
M	--	MIKE	MIKE	4	···-	FOUR	FOW-ER
N	-·	NOVEMBER	NO-VEM-BER	5	···	FIVE	FIFE
O	-·-	OSCAR	OSS-CAH	6	-···	SIX	SIX
P	···	PAPA	PAH-PAH	7	-···	SEVEN	SEV-EN
Q	-··-	QUEBEC	KEH-BECK	8	-···	EIGHT	AIT
R	··-	ROMEO	ROW-ME-OH	9	-···	NINER	NIN-ER

PHONETIC FIGURES (NUMBERS)

Number	Spoken As:	Number	Spoken As:
0	ZERO	9	NIN ER
1	WUN	10	WUN ZERO
2	TOO	11	WUN WUN
3	THU REE	33	THU REE THU REE
4	FO WER	136	WUN THU REE SIX
5	FI YIV	500	FI YIV HUN DRED
6	SIX	1478	WUN FO WER SEVEN ATE
7	SEVEN	2100	TOO WUN ZERO ZERO
8	ATE	128.1	WUN TOO EIGHT POINT ONE

MARSHALLING SIGNALS (1 OF 2)



Outward motion with thumbs:
PULL CHOCKS



Circular motion of right hand at head level with left arm pointing to engine:
START ENGINE



Raise arm, with fist clenched, horizontally in front of body, and then extend fingers.
RELEASE BRAKE



Arms above head in vertical position with palms facing inward:
THIS MARSHALLER



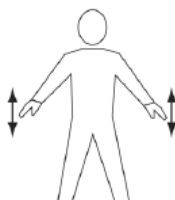
Thumb Up:
OK OR YES



Thumb Down:
NOT OK or NO



Arms a little aside, palms facing backwards and repeatedly moved upward and backward from shoulder height:
MOVE AHEAD



Arms down with palms toward ground, then moved up and down several times:
SLOW DOWN



Arms extended with forearm perpendicular to ground. Palms facing body.
HOT BRAKES



Arms extended with forearm perpendicular to ground. Palms facing body. Gesture indicates right side.
HOT BRAKES - RIGHT



Arms extended with forearm perpendicular to ground. Palms facing body. Gesture indicates left side.
HOT BRAKES - LEFT



Waving arms overhead:
EMERGENCY STOP

MARSHALLING SIGNALS (2 OF 2)



Right or left arm down, other arm moved across the body and extended to indicate direction of next marshaller:
PROCEED TO NEXT MARSHALLER



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



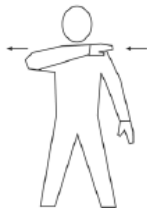
Point left arm downward, right arm repeatedly moved upward-backward. Speed of arm movement indicating rate of turn.
TURN TO THE RIGHT



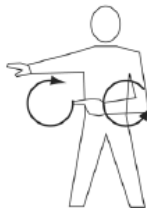
Arms crossed above the head, palms facing forward
STOP



Make a chopping motion with one hand slicing into the flat and open palm of the other hand. Number of fingers extended on left hand indicates affected engine.
FEATHER / FUEL SHUT-OFF



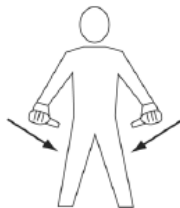
Either arm and hand level with shoulder, hand moving across throat, palm downward:
CUT ENGINES



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



Raise arm and hand, with fingers extended horizontally in front of the body, then clench fist.
ENGAGE BRAKE



Inward motion with thumbs.
INSERT CHOCKS

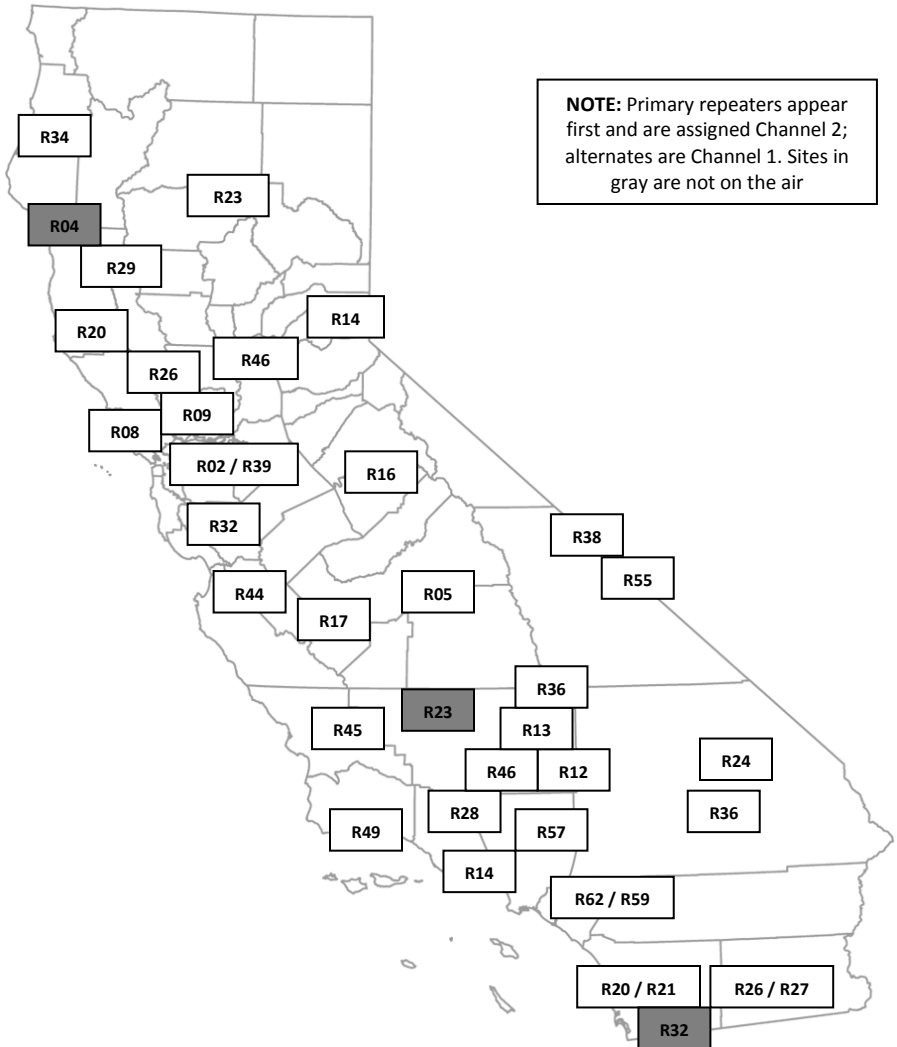


Right arm raised with elbow at shoulder height with palm facing forward.
MARSHALLER FINISHED

CALIFORNIA REPEATER MAP

FOR OFFICIAL USE ONLY

Version: 21 JUNE 2014



FOR OFFICIAL USE ONLY

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FAA FLIGHT PLAN*IN NUMERICAL ORDER FOR FILING VIA PHONE OR RADIO*

1. Flight Plan Type (VFR / IFR / DVFR)	10. Est. Time Enroute (HH, MM)
2. Aircraft ID (CAPXXXX)	11. Remarks (N-# for Aircraft)
3. Aircraft Type / Equipment	12. Fuel on board (HH, MM)
4. True Airspeed	13. Alternate Airport(s)
5. Departure Point	14. Pilot's Name / Address / Phone / Aircraft Home Base
6. Departure Time (Proposed)	15. Number Aboard
7. Cruising Altitude	16. Color of Aircraft
8. Route of Flight	17. Destination Contact (Optional)
9. Destination	

AIRCRAFT EQUIPMENT SUFFIXES

/X	No DME, No Transponder	/B	DME, Transponder with no Mode C
/T	No DME, Transponder with no Mode C	/A	DME, Transponder with Mode C
/U	No DME, Transponder with Mode C	/G	GPS / GNSS equipped aircraft with en route and terminal capability

PIREP FORMAT

1. Location	6. Visibility / Precipitation
2. Time	7. Temperature (°C)
3. Altitude	8. Wind (Direction / Velocity)
4. Aircraft Type	9. Turbulence / Icing
5. Clouds	10. Remarks

Report to FlightWatch: 122.0

BASIC VFR WEATHER MINIMA

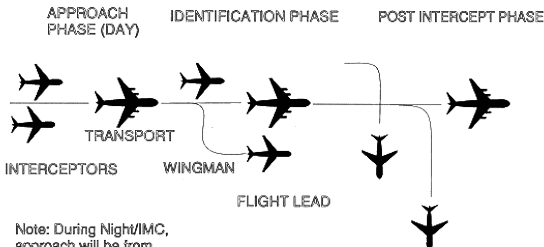
AIRSPACE	FLIGHT VISIBILITY	DISTANCE FROM CLOUDS
Class A	N/A	N/A
Class B	3 statute miles	Clear of Clouds
Class C	3 statute miles	500 ft below 1,000 ft above 2,000 ft horizontal
Class D	3 statute miles	500 ft below 1,000 ft above 2,000 ft horizontal
Class E Less than 10,000 ft MSL	3 statute miles	500 ft below 1,000 ft above 2,000 ft horizontal
Class E At or above 10,000 ft MSL	5 statute miles	1,000 ft below 1,000 ft above 1 statute mile horizontal
Class G 1,200 ft or less above the surface (regardless of MSL altitude)		
Day Class G , except as provided in §91.155(b)	FAA: 1 statute mile (CAP: 3 statute miles)	Clear of Clouds
Night Class G , except as provided in §91.155(b)	3 statute miles	500 ft below 1,000 ft above 2,000 ft horizontal
More than 1,200 ft above the surface but less than 10,000 ft MSL		
Day VFR	FAA: 1 statute mile (CAP: 3 statute miles)	500 ft below 1,000 ft above 2,000 ft horizontal
Night VFR	3 statute miles	500 ft below 1,000 ft above 2,000 ft horizontal
More than 1,200 above the surface and at or above 10,000' MSL		
ALL	5 statute miles	1,000 ft below 1,000 ft above 1 statute mile horizontal

INTERCEPT PROCEDURES

Monitor Guard: 121.5

Intercepting aircraft Signal	Meaning	Intercepted aircraft response	Meaning
Rocks Wings. After ack., initiates a slow level turn to desired heading	You have been intercepted; follow me	Rocks wings and follows. (At night, flash nav lights)	I understand and will comply
Abrupt breakaway (90° turn <u>w/o</u> crossing target aircraft's path)	You may proceed	Rocks Wings	I understand and will comply
Circles airport, lowers landing gear, and over-flies runway in the direction of landing (night: turns landing lights on)	Land at this airport	Lowers landing gear, follows the interceptor and lands if the runway is considered safe	I understand and will comply
Raises gear while overflying runway between 1000' and 2000'	This airport is inadequate	If the intercepted aircraft is requesting alternative field, use the procedures above	Understood, follow me
Performs the breakaway maneuver listed above	Understood	Pilot switches all lights on/off at regular intervals	Cannot comply
Performs the breakaway maneuver listed above	Understood	Pilot switches all lights on/off at irregular intervals	In distress

INTERCEPTION PATTERNS FOR IDENTIFICATION OF INTERCEPTED AIRCRAFT (TYPICAL)



Note: During Night/IMC, approach will be from below flight path.

LATITUDE-LONGITUDE DECIMAL CONVERSION CHART

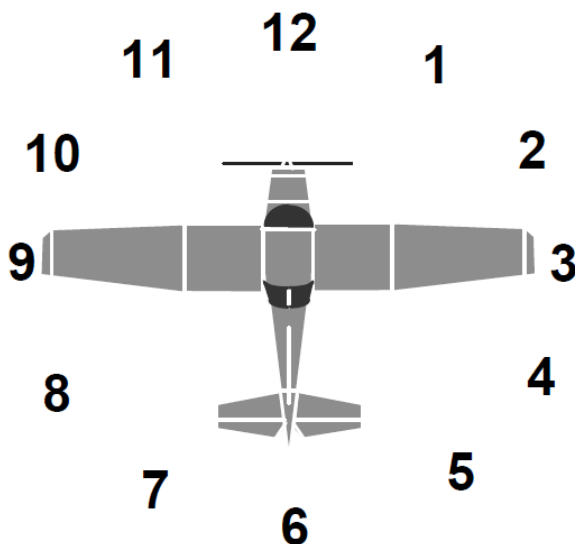
When coordinating between GPS (or LORAN) units to maps or to different equipment (other GPS receivers, for example) you may have to convert from a whole number format to a decimal format, or vice-versa. This chart simplifies the math for conversion between formats. MOST GPS units (and AFRCC SARSAT hits) use whole degrees with decimal minutes, NOT seconds! The format looks like this: DD MM.mmm. Here is a chart of possible formats:

LATITUDE-LONGITUDE FORMATS (all of these represent the same point on the Earth)				
DECIMAL MINUTES	DECIMAL DEGREES	DEG-MIN-SEC	NEGATIVE DECIMAL	
44° 59.34'N	92° 44.82'W	44.989° N 92.747° W	44° 59' 20.4"N	092° 44' 49.2"W
			44.989°	-92.747°

MINUTES TO DECIMAL DEGREES or SECONDS TO DECIMAL MINUTES

Min	Dec	Min	Dec	Min	Dec	Min	Dec	
01'	0.017	16'	0.267	31'	0.517	46'	0.767	<p>To convert whole minutes to decimal degrees, add the decimal value of the minute (from chart) to the decimal number of degrees. Example: $98^{\circ} 49' = 98 + 0.817 = 98.817^{\circ}$</p> <p>You can also use the same numbers to convert SECONDS to DECIMAL MINUTES. <u>This will likely be the most common conversion you will need to make.</u></p> <p>Example: $40^{\circ} 11' 17'' = 40^{\circ} 11 + 0.283 = 40^{\circ} 11.283'$</p>
02'	0.033	17'	0.283	32'	0.533	47'	0.783	
03'	0.050	18'	0.300	33'	0.550	48'	0.800	
04'	0.067	19'	0.317	34'	0.567	49'	0.817	
05'	0.083	20'	0.333	35'	0.583	50'	0.833	
06'	0.100	21'	0.350	36'	0.600	51'	0.850	
07'	0.117	22'	0.367	37'	0.617	52'	0.867	
08'	0.133	23'	0.383	38'	0.633	53'	0.883	
09'	0.150	24'	0.400	39'	0.650	54'	0.900	
10'	0.167	25'	0.417	40'	0.667	55'	0.917	
11'	0.183	26'	0.433	41'	0.683	56'	0.933	
12'	0.200	27'	0.450	42'	0.700	57'	0.950	
13'	0.217	28'	0.467	43'	0.717	58'	0.967	
14'	0.233	29'	0.483	44'	0.733	59'	0.983	
15'	0.250	30'	0.500	45'	0.750	60'	1.000	

AIRCRAFT CLOCK POSITIONS

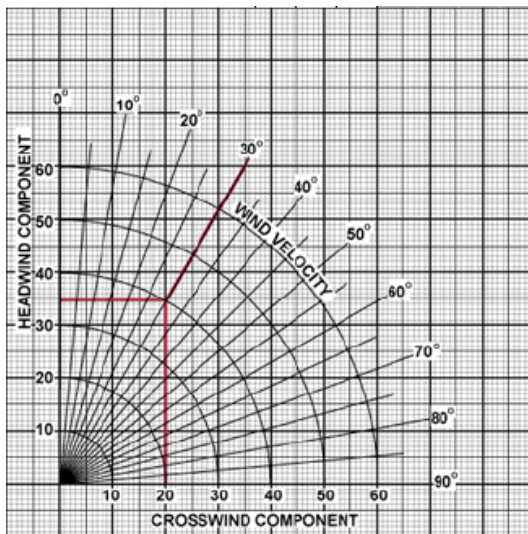


CROSSWIND COMPONENT DATA

MAX DEMONSTRATED X-WIND 15KTS (C182)

NOTE: FOR GENERAL REFERENCE ONLY.
REFER TO POH FOR YOUR AIRCRAFT FOR MOST ACCURATE DATA

WIND SPEED	DEGREES OFF RUNWAY HEADING								
	10	20	30	40	50	60	70	80	90
8	1	3	4	5	6	7	8	8	8
9	2	3	4	6	7	8	8	9	9
10	2	3	5	6	8	9	9	10	10
11	2	4	5	7	8	10	10	11	11
12	2	4	6	8	9	10	11	12	12
13	2	4	6	8	10	11	12	13	13
14	2	5	7	9	11	12	13	14	14
15	3	5	7	10	11	13	14	15	15
16	3	5	8	10	12	14	15		
17	3	6	8	11	13	15			
18	3	6	9	12	14				
19	3	6	9	12	15				
20	3	7	10	13	15				
21	4	7	10	13					
22	4	8	11	14					
23	4	8	11	15					
24	4	8	12	15					
25	4	9	12						
26	5	9	13						



- 20° Flaps or less recommend when X-wind component is greater than 10 kts
- Max X-wind data is for DRY runway conditions

COMMUNICATIONS FLIMSY

Use this checklist to gather all necessary comms information

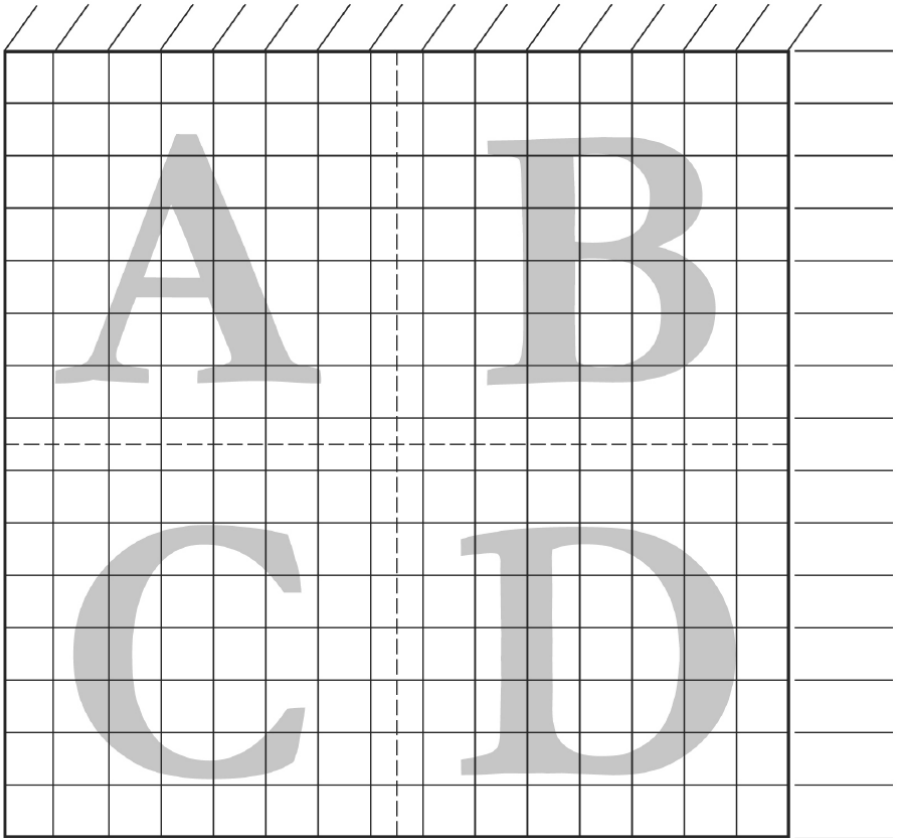
AIRCRAFT TAIL NUMBER:	AIRCRAFT CALLSIGN:
MISSION BASE CALLSIGN:	MISSION BASE TELEPHONE:
MISSION BASE FREQUENCIES:	AIR-TO-AIR FREQUENCIES:
HIGHBIRD LOCATION:	OTHER AIRCRAFT CALLSIGNS:
GROUND TEAM FREQUENCIES:	GROUND TEAM CALLSIGNS:
GT VEHICLE DESCRIPTION:	GT RENDEZVOUS LOCATION:
GT RENDEZVOUS WINDOW:	GT PHONE NUMBER:
WING HQ PHONE NUMBER:	TIME HACK PHONE NUMBERS: (202) 762-1401 / (303) 499-7111
MISSION / SORTIE NUMBER:	AFRCC PHONE: (800) 851-3051
NOTES	NOTES

GRID COORDINATES

SECTIONAL: _____ GRID#: _____

INGRESS PT: _____ W: _____

EGRESS PT: _____ W: _____



RADIO NAVIGATION AIDS

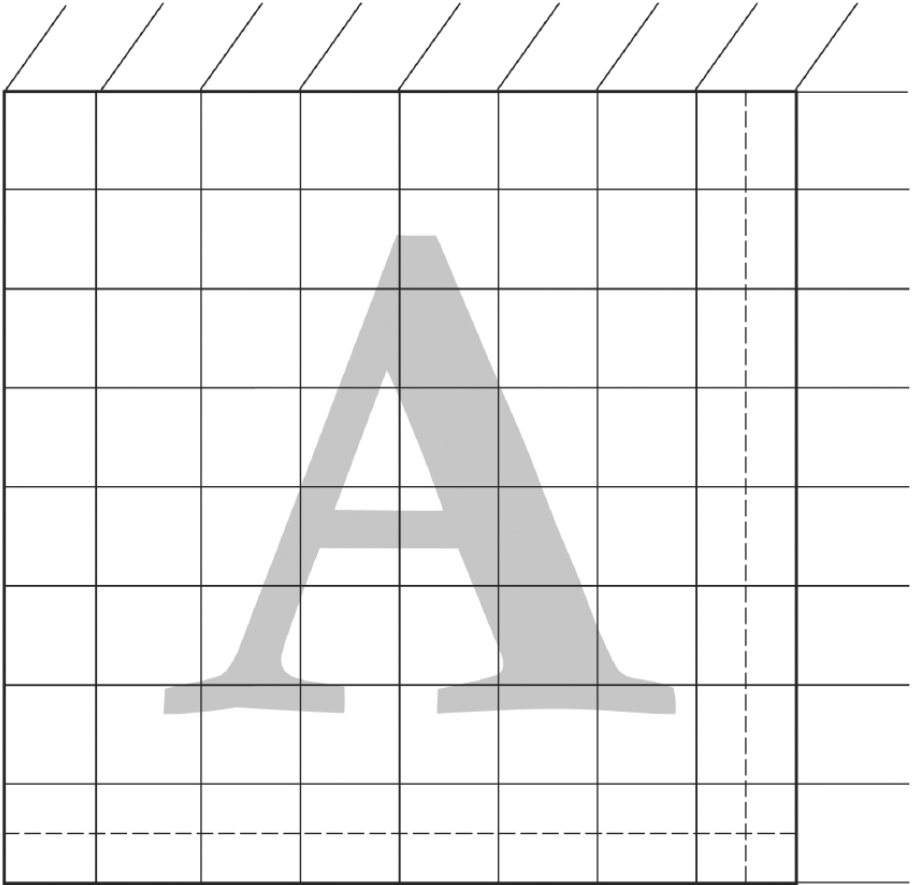
#	IDENTIFIER	FREQUENCY	RADIAL
1			
2			
3			
4			

QUARTER GRID COORDINATES A

SECTIONAL: _____ GRID#: _____

INGRESS PT: _____ W: _____

EGRESS PT: _____ W: _____



RADIO NAVIGATION AIDS

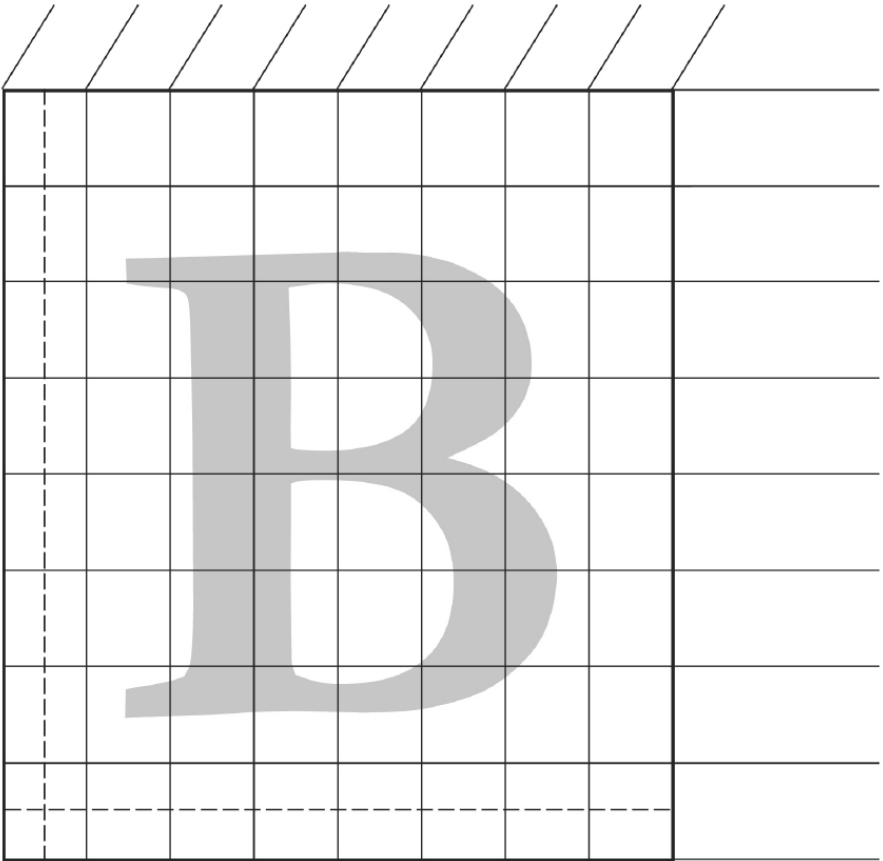
#	IDENTIFIER	FREQUENCY	RADIAL
1			
2			
3			
4			

QUARTER GRID COORDINATES B

SECTIONAL: _____ **GRID#:** _____

INGRESS PT: _____ **W:** _____

EGRESS PT: _____ **W:** _____



RADIO NAVIGATION AIDS

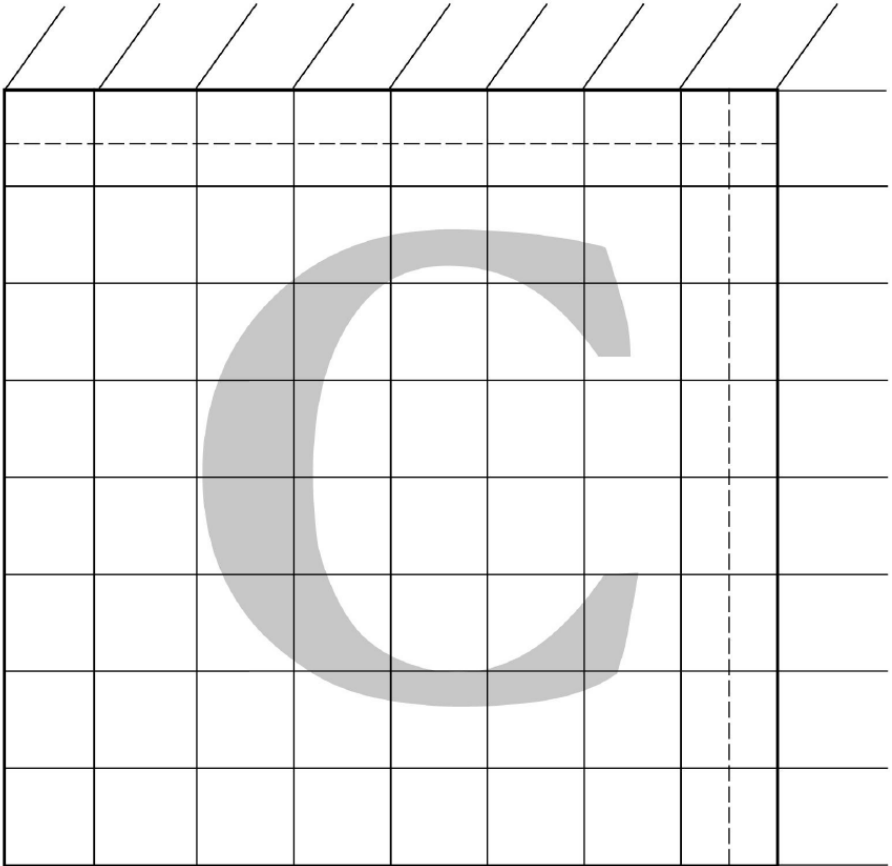
#	IDENTIFIER	FREQUENCY	RADIAL
1			
2			
3			
4			

QUARTER GRID COORDINATES C

SECTIONAL: _____ GRID#: _____

INGRESS PT: _____ W: _____

EGRESS PT: _____ W: _____



RADIO NAVIGATION AIDS

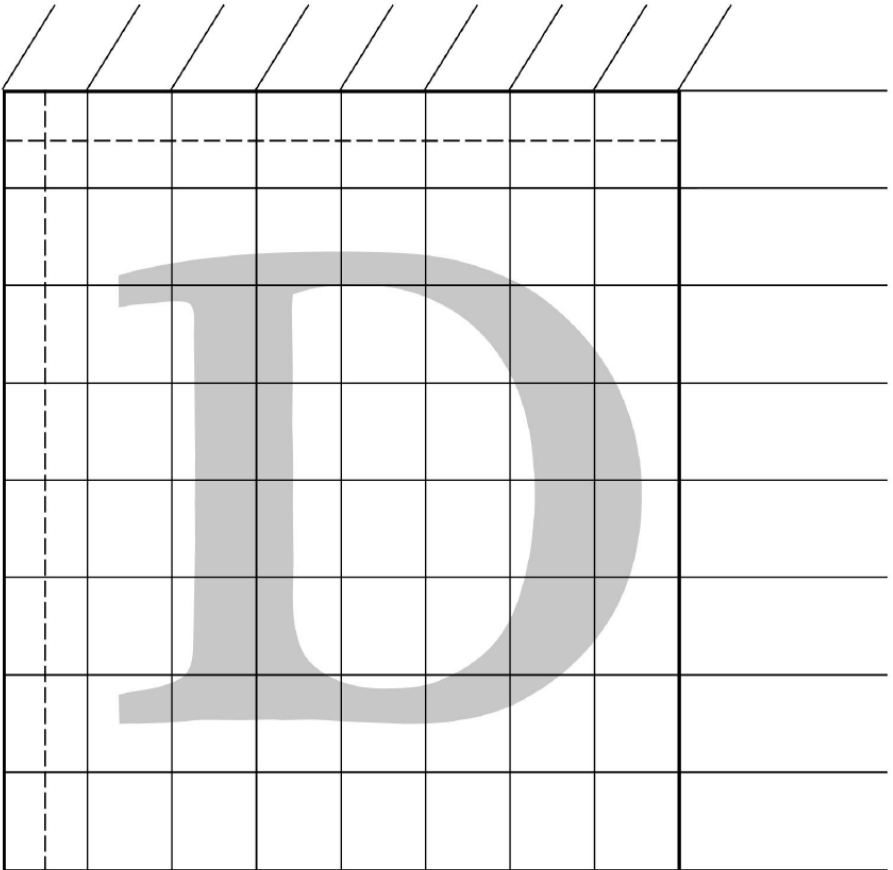
#	IDENTIFIER	FREQUENCY	RADIAL
1			
2			
3			
4			

QUARTER GRID COORDINATES D

SECTIONAL: _____ GRID#: _____

INGRESS PT: _____ W: _____

EGRESS PT: _____ W: _____



RADIO NAVIGATION AIDS

#	IDENTIFIER	FREQUENCY	RADIAL
1			
2			
3			
4			

ROUTE SEARCH / CREEPING LINE

SECTIONAL: _____ **GRID#:** _____

INGRESS PT: _____ **W:** _____

EGRESS PT: _____ **W:** _____

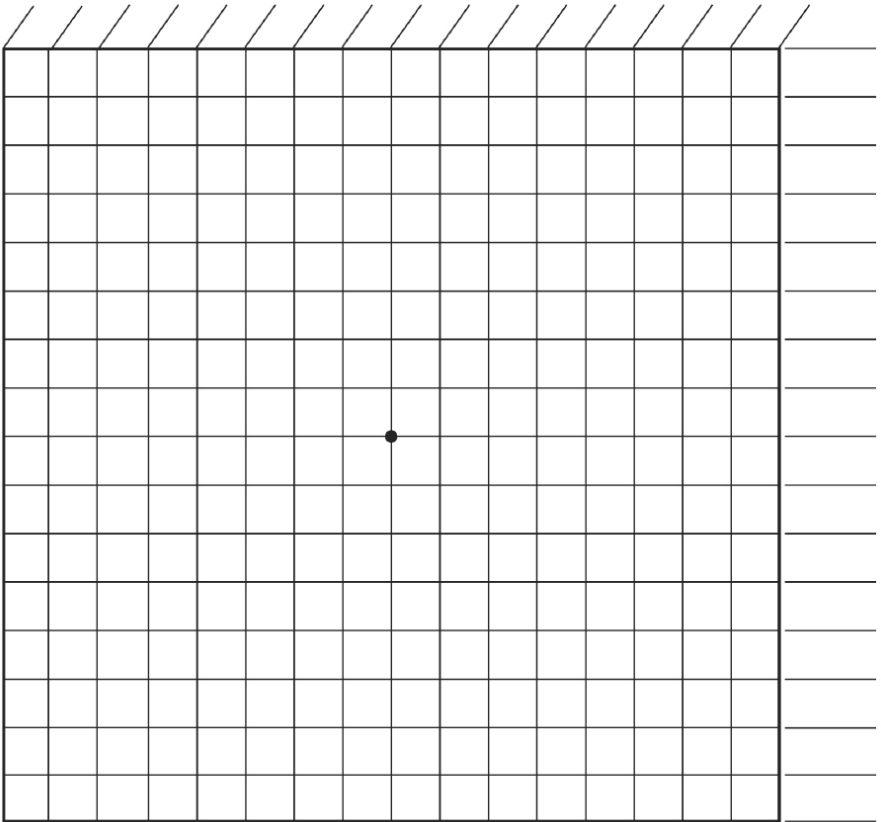
#	IDENTIFIER	FREQUENCY	RADIAL
1			
2			
3			
4			

EXPANDING SQUARE

SECTIONAL: _____ GRID#: _____

INGRESS PT: _____ W: _____

EGRESS PT: _____ W: _____



RADIO NAVIGATION AIDS

#	IDENTIFIER	FREQUENCY	RADIAL
1			
2			
3			
4			

AERIAL PHOTOGRAPHY LOG

AIRCRAFT: _____ DATE: ____/____/____

PHOTO NUMBER	TIME: _____	24HR	L	Z
AM PM				
DESCRIPTION				
COORDINATES:		LAT-LONG		
NORTH: _____ ° _____ ' _____ "		WEST: _____ ° _____ ' _____ "		
DIRECTION OF AIRCRAFT TRAVEL: N NE E SE S SW W NW		DIRECTION OF PHOTO HEADING: N NE E SE S SW W NW		
ALTITUDE	AGL MSL	DISTANCE TO SITE		NM MI KM
REMARKS:				

PHOTO NUMBER	TIME: _____	24HR	L	Z
AM PM				
DESCRIPTION				
COORDINATES:		LAT-LONG		
NORTH: _____ ° _____ ' _____ "		WEST: _____ ° _____ ' _____ "		
DIRECTION OF AIRCRAFT TRAVEL: N NE E SE S SW W NW		DIRECTION OF PHOTO HEADING: N NE E SE S SW W NW		
ALTITUDE	AGL MSL	DISTANCE TO SITE		NM MI KM
REMARKS:				

PHOTO NUMBER	TIME: _____	24HR	L	Z
AM PM				
DESCRIPTION				
COORDINATES:		LAT-LONG		
NORTH: _____ ° _____ ' _____ "		WEST: _____ ° _____ ' _____ "		
DIRECTION OF AIRCRAFT TRAVEL: N NE E SE S SW W NW		DIRECTION OF PHOTO HEADING: N NE E SE S SW W NW		
ALTITUDE	AGL MSL	DISTANCE TO SITE		NM MI KM
REMARKS:				

PHOTO NUMBER	TIME: _____	24HR	L	Z
AM PM				
DESCRIPTION				
COORDINATES:		LAT-LONG		
NORTH: _____ ° _____ ' _____ "		WEST: _____ ° _____ ' _____ "		
DIRECTION OF AIRCRAFT TRAVEL: N NE E SE S SW W NW		DIRECTION OF PHOTO HEADING: N NE E SE S SW W NW		
ALTITUDE	AGL MSL	DISTANCE TO SITE		NM MI KM
REMARKS:				

OBSERVER / SCANNER SEARCH AREA WORKSHEET

A/C # _____ MSN PILOT: _____ PILOT/OBS: _____ OBS/SCN: _____ OBS/SCN: _____	MISSION # _____ SORTIE # _____ SECTIONAL: _____ GRID # _____ A B C D CAP # _____ FREQUENCY _____
---	---

<i>SEARCH NUMBER</i>	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>
<i>START</i> TIME	_____	_____	_____	_____
HOBBS	_____	_____	_____	_____
 <i>TAKEOFF</i> TIME	_____	_____	_____	_____
HOBBS	_____	_____	_____	_____
 <i>IN AREA</i> TIME	_____	_____	_____	_____
HOBBS	_____	_____	_____	_____
 <i>OUT OF</i> TIME	_____	_____	_____	_____
<i>AREA</i> HOBBS	_____	_____	_____	_____
 <i>LAND</i> TIME	_____	_____	_____	_____
HOBBS	_____	_____	_____	_____
 <i>SHUT</i> TIME	_____	_____	_____	_____
<i>DOWN</i> HOBBS	_____	_____	_____	_____

