NAVAL AIR TRAINING COMMAND

NAS CORPUS CHRISTI, TEXAS **CNATRA P-428 (Rev 07-23)**

FLIGHT TRAINING INSTRUCTION

NAVIGATION
ADVANCED PHASE
TH-57

2023

DEPARTMENT OF THE NAVY
CHIEF OF NAVAL AIR TRAINING
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Subj: FLIGHT TRAINING INSTRUCTION, NAVIGATION ADVANCED PHASE, TH-57

1. CNATRA P-428 (Rev 07-23) PAT, "Flight Training Instruction, Navigation Advanced Phase, TH-57" is issued for information, standardization of instruction, and guidance to all flight instructors and student military aviators within the Naval Air Training Command.

2. This publication is an explanatory aid to the Helicopter curriculum and shall be the authority for the execution of all flight procedures and maneuvers herein contained.

3. Recommendations for changes shall be submitted via the electronic Training Change Request (TCR) form located on the Chief Naval Air Training (CNATRA) website.

4. CNATRA P-428 (New 02-21) PAT is hereby cancelled and superseded.

T. P. ATHERTON
By direction

Releasability and distribution:
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FLIGHT TRAINING INSTRUCTION

FOR

NAVIGATION ADVANCED PHASE

TH-57

Q-2C-3156

LIST OF EFFECTIVE PAGES

Dates of issue for original and changed pages are:
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Page No.	Change no.	Page No.	Change No.
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INTERIM CHANGE SUMMARY

The following Changes have been previously incorporated in this manual:

CHANGE NUMBER	REMARKS/PURPOSE

The following interim Changes have been incorporated in this Change/Revision:

INTERIM CHANGE NUMBER	REMARKS/PURPOSE	ENTERED BY	DATE

INTRODUCTION

Congratulations! Assuming your familiarization flights are complete, you are now entering a new phase in flight training: Advanced Navigation. Learning to safely fly the helicopter is no small feat, however, learning to operationally fly the helicopter from point A to point B in poor weather conditions, day and night, is not only a fundamental skill required in Naval Aviation, it also defines a ***professional Naval Aviator.*** As you progress through flight training, more demand will be placed on your overall aviation, navigation, and communication skills, not to exclude situational awareness, Crew Resource Management (CRM), and decision-making processes. Overall, your goal is to successfully complete this phase of flight training and earn your Standard Instrument Rating, a major step toward earning your wings of gold.

SCOPE

This publication contains maneuver descriptions encompassing the Navigation events for both aircraft and simulators listed in the Advanced Multi-Service Pilot Training System Curriculum (CNATRAINST 1542.156 series). However, it does not contain maneuver descriptions previously covered in other FTI publications, such as the Contact FTI. It is your responsibility to have a thorough knowledge of the contents within all FTIs.

CHANGE RECOMMENDATIONS

Change recommendations to this publication may be submitted by anyone to the Commander, Training Air Wing FIVE, using the Training Change Request (TCR) process which improves training curricula and its associated training publications. This includes all personnel involved at every level of flight training. A TCR can be submitted online (https://www.cnatra.navy.mil/tip.asp) or by submitting a form to the squadron or wing standardization personnel. Remember, no TCR is too small!

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HELICOPTER LOW LEVEL NAVIGATION

100. INTRODUCTION

Helicopter low level navigation is an integral part of the aviator skill set and contributes to mission accomplishment. The maneuvers introduced in the following sections are the foundation that all military operational tactics are built upon. While in the Terrain Flight (TRF) syllabus, you will utilize three preplanned routes that have been designed to emphasize specific navigational features. The routes and their navigational emphasis are as follows:

Green Route Day: Navigational emphasis should be placed on aim-points, limiting features, funneling features, and intermediate check points. Designed to demonstrate how good checkpoint selection gives you multiple ways to easily identify checkpoints (CP).

Green Route Night Vision Goggle (NVG): Navigational emphasis should be placed on limiting features, funneling features, timing, and intermediate CPs.

Orange Route: Navigational emphasis should be placed on limiting and funneling features. Designed to demonstrate how good utilization of limiting and funneling features will aid in navigation. Most CPs are good ground force CPs, but may be harder to located from the air due to lack of aim points. By identifying the funneling features, you can drive right to each CP.

Purple Route: Navigational emphasis should be placed on terrain, contours, and limiting features. (Yes, there is such a thing as micro terrain in NW FL.) Designed to show how, at lower altitudes, terrain is much easier to distinguish, but aim-points and funneling features may be harder to identify. Encourage the Student Naval Aviators (SNA) and Instructors Under Training (IUT) to really dig into their map contour lines.

Aim-Point: Any feature that is obvious, clearly distinguishable, and provides a steer to the next checkpoint.

Bingo: Fuel state needed for recovery IAW NATOPS. Proceed/am proceeding to specified base, field, or ship. Recovery at a NOLF, KNDZ, or other airfield is acceptable.

Dead Reckoning: A method of calculating one's current position by using a previously determined position or fix, and advancing that position based upon known or estimated speeds over elapsed time. It is the primary navigation in underdeveloped areas lacking navigation aids, and when the tactical situation dictates or Nap-Of-the-Earth (NOE) flying.

Funneling Feature: Any linear feature, manmade (road) or natural (river), that leads to the next CP.

Joint Operations Graphic-Air (JOG-A): The JOG-A is an aeronautical chart for international and joint service air/ground tactical operations that focuses on identifying horizontal control points and low altitude air navigation hazards. The JOG-A is used for tactical air support/assault

missions with ground forces, and is printed on a Mercator projection. Ground units commonly use the JOG-A as a strategic/operational map to complement the 1:50,000 topographic line map.

Joker: Fuel State above Bingo at which separation, Bug-Out, or event termination should begin.

Intermediate CP: Any feature on your planned route between two checkpoints that provides a good navigational reference.

Landing Zone (LZ): Any specified zone used for the landing of aircraft. Typically named after birds.

Limiting Feature: Any manmade or terrain feature that defines a limit to the leg of flight. Linear limiting features are best (river or road), but point features (tower) can also be used.

Mission Fuel: The minimum fuel required to complete the mission, [course rules, route, landings at LZ, and RTB] and land within NATOPS minimums fuel on deck. Recovery at a NOLF, KNDZ, or other airfield is acceptable.

Pilotage: is a method of determining a position over the ground using map-to-ground orientation.

Rolex: Timeline adjustment in minutes. Is always referenced from original preplanned mission execution time. “Plus” means later; “minus” means earlier.

Time-on-Target (TOT): Ordnance impact time on the target. Post mission - the actual time of attack.

Topographic Line MAP (TLM) 1:50,000: The 1:50,000 TLM is a lithographic map that portrays the greater detail of topographic and cultural information. Relief is shown by contours and spot elevations measured in meters. The map is a true representation of terrain detail. Features are plotted to correct orientation and true location. The map depicts the level of detail required for infantry and reconnaissance units to navigate in various terrain environments including jungle, mountain, arctic, and desert. The 1:50,000 TLM supplements a commander’s reconnaissance of his/her zone of action by providing basic terrain analysis information in sufficient detail to support intelligence preparation of the battlefield.

VFR Sectional – Sectional Aeronautical Charts include the most current data at a scale of 1:500,000 which is large enough to be read easily by pilots flying under Visual Flight Rules. Sectionals are named after a major city within its area of coverage. They are updated frequently but are not very detailed. The lack of detail, due to scale, makes the VFR Sectional less effective in the terrain flight environment.

101. CONDUCT OF MISSION PROCEDURES

Any mission may be divided into four phases: Planning, Brief, Execution and De-Brief.

1. Planning – All flight preparation from the receipt of the mission order to the delivery of the mission brief.

2. Brief – A formal brief of the Mission Commander's plan to accomplish the mission.

3. Execution – Mission Commander's plan in action.

4. De-Brief – Analysis of the successes and failures of the previous three phases.

102. MISSION PLANNING PROCEDURES

The mission planning phase includes all the tasks that must be completed for a successful brief and mission. For all operations, mission planning always begins with the **mission analysis**, or the Mission Commander's study of the assigned mission.

Helicopter pilots must be proficient at **power management, timing, fuel planning, route selection, and terminal area tactics**. These areas are the foundation for both planning and executing an array of missions.

For training purposes, TRF flights shall be conducted only on designated routes. Routes are delineated in the MPTS according to the event.

Terminal Area/Objective Area

Mission analysis begins by considering the mission objective inside the terminal area (TA), or objective area, and working outward from there. The objective in the TA dictates every other aspect of mission planning. First, assess the LZ. Determine ingress, LZ characteristics, wind effects, egress and obstacles, and power requirements. Ingress is entry into the TA and egress is the route out of the TA. SWEEP is the acronym that will be used to describe the LZ IAW NATOPS. SWEEP should be used to brief the LZ, as well as reassess the LZ real time in the flight.

SWEEP:

- **S – Size, slope, suitability, and surface**. How big, direction of general slope, how many aircraft can land in the zone, and the makeup of the terrain.

- **W – Wind effect**. A cirque (a bowl-shaped mountain basin that can sometimes have steep walls) may have swirling winds. A ridge top (a long, narrow elevation of land) may have hazardous mountain top winds. Similarly, a flat zone may have no wind below 50' when obstructed by vegetation.

- **E – Elevation**. When approaching an LZ, terrain may not be level and knowing the elevation of the LZ may be the best way to set up for a normal approach profile to the zone, particularly at night when visual cues are lacking.

- **E – Egress / Obstacles**. Include egress direction and obstacles. Egress may be a descending turn when departing a mountain top pinnacle or may be the same direction as the approach. Obstacles and terrain considerations are crucial.

- **P – Power Available / Power Required**. Power available as calculated from the NATOPS manual at the LZ elevation. Power required is HIGE/HOGE requirement at LZ elevation.

Example – "Harold is a 5000'x3000' "T" shaped level grass field. Terrain is marked by 4 gravel diamonds for each LZ and the grassy areas have some relatively deep holes. Anticipated winds are 360, and during landing a loss of wind effect can be anticipated near the northern boundary due to 75' tall trees. Elevation is 159'. Egress will be straight ahead with 75' tall trees to clear. Power available is 100% and Calculated Power required to HIGE/HOGE based on expected arrival time and fuel load is 78%/88%."

Power Management

SNAs need to develop a thorough understanding of power calculations and how they pertain to the planned flight profile. **Power required** (Pr) shall be calculated for initial takeoff and for the planned LZ operations. SNAs should also understand **power available** (Pa) and how it impacts calculated Pr. During operational missions the aircraft may not have the power to HIGE or HOGE at certain altitudes and/or weights. Your level flight envelope (the airspeeds at which you are physically capable of flying without drooping Nr or descending) may be truncated given environmental considerations and/or configuration of the aircraft. For example, you may be required to conduct a Humanitarian Assistance and Disaster Relief (HADR) efforts in a mountain village in Haiti following a hurricane. When assigned to bring more than 2,000 lbs. of food, supplies, and medical equipment, you run your power calculations. Your calculations reveal that your Pa exceeds Pr at sea level, but given temperature and altitude at higher elevations, your Pr will exceed Pa at the village LZ. You will need to consider taking fewer supplies, less fuel, or landing at a different location.

After assessing the LZ and power requirements, you will estimate the time required to fly the route and accomplish the objective inside the TA.

Timing

Missions are event driven or time based. If time based, a TOT will be assigned for ordnance on target or an aircraft arriving at an LZ for an assigned task. Multiple entities may count on you to hit a TOT within a margin of seconds.

In the planning phase, you may be assigned a specific TOT. The Mission Commander will work backwards from the TOT based on TA objective time and planned route time to determine what time the crews should brief, walk, preflight, takeoff, and arrive at each checkpoint.

TA timing is the required time estimated to achieve the objective. Objectives may include dropping ordnance on a target, landing to off-load troops, or recovering personnel. Route timing is based on planned **groundspeed**. Accurate preflight planning enables aviators to quickly determine and adjust timing during the mission execution to hit the required TOT.

Timing is imperative for missions with multiple units operating simultaneously around a TOT. Global Positioning System (GPS) time is typically used to ensure all airborne and ground units use the same time. However, it is ***critical*** that all crews get an accurate time hack prior to takeoff in case a loss of GPS occurs. If GPS is available in flight, it should be considered the most accurate source of timing information.

Based on the time required for the TA objective and route, you will calculate mission fuel. *For training purposes, TOTs will be based only on route time from the first CP to the last CP, not including Dynamic Landing Approaches DLAs at the LZ.*

Fuel Planning and Computation

Next, you will use the timing to determine fuel required for the route and TA objective to arrive at next fuel stop (KNDZ, Site X, Florala, etc.) with NATOPS minimum fuel. If the LZ has RWOP minimum departure fuel, account for that when determining the mission fuel.

Successful fuel planning is accomplished by utilizing accurate burn rates for max range, max endurance, ground speed, and full open or flight idle. Fuel flow can be calculated for the different flight profiles and ambient conditions using the NATOPS charts. The preferred method for calculating mission fuel is Joint Mission Planning Software (JMPS). JMPS uses data such as temperatures, altitude, aircraft weight, and airspeed to calculate fuel burn. Actual flight conditions may change the fuel burn rate, requiring manual fuel flow calculations.

The time required for Dynamic Landing Approaches will be put into JMPS as a ‘delay’ at the LZ checkpoint. Determine the fuel required for the delay using the charts in the NATOPS using 70 KIAS (pattern airspeed) and the appropriate ambient conditions at the field. This calculation will be conservative due to the time spent on the deck between approaches.

Determine fuel required to fly from the point of departure to the TA or LZ. This will include course rules, the low-level route to be flown, and course rules to the NOLF. Your calculations will be based on 90 KIAS for the route and 100 KIAS for course rules. During execution, you must assess real-time fuel burn based on environmental conditions. **Wind may effect fuel burn and time.**

Route Selection

When selecting routes for operational missions, aircrew plan for time and fuel efficiency, or for detection avoidance. Criteria to consider include terrain, elevation, enemy location, and weapon engagement zone. Routes are planned to keep higher terrain or thicker vegetation between you and the enemy, and to avoid densely populated areas or linear manmade features.

Terrain features are preferred over manmade objects for route CPs. Manmade features are subject to change and newly constructed features may be mistaken for intended CPs. Terrain features change less frequently over time.

In the training environment, the checkpoints and routes are preplanned to enforce basic navigation for low altitude flight.

GO/NO-GO Criteria

Go criteria are the prerequisites that need to be met (equipment, personnel, or conditions) prior to mission commencement, and are based on friendly disposition. No-Go criteria are those same prerequisites based on enemy disposition.

NOTE

No-Go criteria will not apply to TW-5 aircraft.

Maps and Chart Study

Different types of maps may be used depending on the mission or the phase of the mission, including the VFR Sectional, JOG-A, and various 1:50,000 TLM maps and charts will be used. Reference definitions section.

The maps available during planning and execution may not have the most current aviation hazards, manmade features, and other topography information. There are many methods of updating your maps with more current information to help successfully navigate the route.

Map Changeover Point (MCP)

During flight routes it is often necessary to transition between charts and maps. These transitions can occur when the flight route departs the area depicted on the chart or map, or may occur when it is necessary to transition to a larger or smaller scale chart or map. You will choose an MCP, a point easily identifiable on both charts and maps, which facilitates a smooth transition between charts and maps while in flight. The MCP should be selected so as not to be on the edge of the chart or map, leaving some additional route beyond the MCP in order to become oriented. A MCP at the edge of a chart or map may lead to disorientation during the map changeover.

During navigation training the VFR Sectional, JOG-A, and various 1:50,000 TLM maps and charts will be used.

1-6 HELICOPTER LOW LEVEL NAVIGATION

Photographic and Satellite Imagery

Photographs and satellite imagery provide multiple advantages. They offer greater detail, more current topographical information, and updated man-made features. There are disadvantages as well. Details may be obscured by buildings, clouds, or vegetation, position and the location, scale, and elevations are only approximate unless geo-referenced grids are calculated. Lack of color and contrast in photos may make them difficult to see in poor light, such as a night flight.

Commercial satellite imagery is another, non-official, source to update your route maps and perform a map study. An important aspect of using satellite imagery is determining how current the information is. Imagery that is several months or years old may show topographical differences that could lead to disorientation during the flight.

JMPS has several tools that can be used to ensure maps and charts have the most current information, and to perform a thorough map study during pre-mission planning. After you have built your route in JMPS, zoom in to view to satellite imagery. JMPS satellite imagery is on a scheduled update cycle and is more current than the JOG-A and 1:50,000 TLM.

Another application in JMPS is Sky View. Sky View will give you a 3D sky view of the route providing the same perspective that would be seen from a specific altitude and heading. The user can set and adjust the altitude and heading to view the route.

Map Study

Once the route of flight has been drawn on the map, a thorough map study can be accomplished. For each leg of flight along the route the crew should establish both left and right lateral limits, a CP funneling feature, a CP limiting feature and intermediate features along the intended route. These features will guide the aircraft toward the desired CP on time and keep the navigator from straying off the intended route. Consider seasonal changes to determine how a piece of terrain will appear. Annotate hazards and plan deviations as necessary. Lastly, note the position of the sun and moon illumination (when visible) throughout the mission timeline.

This map study should include analysis of the assigned area using JMPS and other resources. Imagery available on JMPS can greatly increase aircrew situation awareness of a given area prior to conducting the mission. Additionally, intended routes can be flown using mission planning software to increase SA during the mission. A map study provides the crew with an advance look at the terrain features and other specifics that may be encountered when operating at Terrain Flight (TERF) altitudes. A detailed map study will include review of and orientation to the following details:

- Topography such as terrain elevation.
- Hydrography to include lakes, rivers, etc.
- Manmade and natural hazards. This includes towers, power lines, and tall buildings in addition to mountain peaks and trees.

- Airspace de-confliction such as Class “C” and “D” as well as Restricted Areas and locally imposed noise sensitive areas.

- The route itself, with expected limiting and funneling features, aim-points, and intermediate checkpoints.

Consider assembling as many different maps of the area of operations as possible. Additionally, satellite imagery, road maps, and VFR sectionals will increase SA.

Conducting a good map study will help you reach your TA or objective area on time, alleviate cockpit workload during a high workload portion of the mission, and aid in hitting your TOT.

103. MISSION PRODUCTS

Mission Smart Packs

A mission “smart pack” ensures all aircrew are referencing the same information and material throughout the flight. It may include power calculations specific to each aircraft, a communications card with frequencies, troop and ordinance load outs for the flight, and an “execution checklist” for the sequence of events for the mission. The “smart pack” is essentially a gouge packet for the mission that contains information for each “player” involved. Ask your instructor to elaborate on the use of “smart packs” during operational missions.

Student “smart packs” shall include:

- Cover sheet that includes, at a minimum: aircraft assignments, power calculations, frequencies for the route, and a sequence of events utilizing “T minus” times. Review the schedule to determine if you are a hot-seat or cold-go. If you are unsure, call your IP (crew rest/crew day dependent) or decide on one course of action and plan it. Similar to operational missions, you may need to adjust your plans according to weather, OPS, or maintenance.

- JMPS route card for the entire route (KNDZ, course rules to the route, the route, course rules to OLF, 20 minutes of DLAs, and course rules to KNDZ).

- JMPS route card for the “bingo” route (the route from the “bingo” CP direct to course rules entry point, then course rules to NOLF, KNDZ, or appropriate airfield all flown at max-range airspeed).

- LZ diagram for where you will be conducting DLAs.

SNA shall produce two “smart packs.” One will be provided for the IP and the other is for the SNA.

Route Cards

Route cards are to be created using JMPS, and should include the departure airfield, course rules to the low level route (if applicable), the low level route, delay at the LZ for DLAs, and course rules to final destination. Follow instructions from the NAV0101A/B Mission Planning Software overview classes.

NOTE

The route card shall be printed utilizing the MAWTS #1/NVG format. Ensure CPs and brief physical descriptions of the CPs are annotated.

Landing Zone Diagram

The LZ diagram is a visual depiction of the landing plan that supports the Mission Commander's scheme of maneuver. The diagrams should be a single source document that contains all pertinent information relative to the landing and actions at the zone. SNAs should consider including the following details in SWEEP format ("Reasoning" column includes tactical considerations as amplifying information that may not apply to training events):

Metric to Consider	Reasoning
Location (Grid or Lat / Long)	Enables quick identification and confirmation in navigation equipment if disoriented.
LZ size in meters	Gives the crew an idea of scale and potentially what type of approach will be made into the zone. Similarly, this will have implications for how many aircraft may land at once.
Magnetic north reference	This standard reference allows the crew to properly orient themselves and others.
Topography	Address whether or not the flight can expect a flat surface or rolling terrain. Perhaps there are areas in the zone that are more ideal to set the aircraft down given ditches, for example.
Soil composition	Firm packed soil, blowing sand, snow, etc. Has it rained heavily there recently? All of these considerations will frame expectations for what sort of environment the approach will encounter. Can we expect a "degraded visual environment" at the end of the approach? Will

	we sink into the ground, or is it firm enough to support our weight?
Elevation	If an LZ is significantly higher than our departure point, we can expect to have to calculate a separate set of power numbers. Likewise, we will need to confirm these numbers prior to making the approach to ensure we meet the margins set by the Mission Commander.
Hazards	Brief hazards such as trees, fence lines, walls, power lines, etc.
Buildings	Similar to hazards, however, buildings may house hidden threats, or may otherwise be of interest in our mission. You should orient the flight as to where these buildings are, their numbering/naming convention (if applicable), and point out particular target buildings if they exist.
Winds	Implications for power requirements.
Ingress direction	Direction from which we approach the LZ (not necessarily same as landing direction). This will impact how the zone will appear to us as we fly inbound. The particular ingress direction will also take into consideration many details about the tactical environment.
Landing formation / sites / points	The manner in which the section will conduct themselves with respect to landing in the LZ. Taking into consideration the entirety of the mission requirements and LZ details, the Mission Commander may prefer certain terminal area tactics. How many aircraft will simultaneously land in the zone, their particular formation into the zone, and their follow-on flight paths out of the zone will all be particular to each mission and each LZ.
Landing direction	Take into account not only the winds but also aforementioned hazards and LZ dimensions.

Egress direction	How will we depart the LZ (i.e., north, east, etc.)? The particular egress direction will also consider the tactical environment.
Wave-off direction	Given all the details about the LZ and our mission, a certain wave-off direction will need to be selected. A wave-off direction for the lead aircraft into the zone may be different for the third aircraft in the formation.
Sun / moon position	Tactical implications. You are encouraged to ask your IP for information about how these details may be applied to terminal area tactics.
Frequencies	Who will we be talking to in the terminal area and on what primary and alternate frequencies? Are we checking-in with a Joint Terminal Attack Controller (JTAC), an Airborne Mission Commander (AMC), or Rescue Mission Coordinator (RMC)?

Figure 1-1 LZ Diagram Considerations

104. CHART AND MAP PREPARATION

1. Each student is responsible for preparing their own charts and maps for each route.

2. Neatness is important. Straightedges and stencils shall be used. Charts and maps should be legible and clean. Remember in all missions, good chart and map preparation will enhance situational awareness while poorly prepared charts will detract from your situational awareness.

3. SNA may keep charts and maps that will be used for other syllabus training events. However, SNAs may **not** use charts and maps created by someone else, and may not give charts or maps to other SNAs for use.

Recommended Equipment:

- Charts and Maps
- Straightedge
- Protractor (capable of identifying grid locations)
- Stencil (capable of making doghouses, circles, triangles)

- Transparent Tape
- Scissors
- Ultrafine Tip Marker (red)
- Fine Tip Markers (red, blue and black)

NOTE

When writing on the charts and maps, the SNA should use a straightedge to ensure the information is professional and legible.

Step 1. Tape the chart and map pages together using scotch tape.

JOG-A (1:250,000) - Ensure Lat/Long and terrain features are aligned properly.

1:50,000 TLM - Ensure the gridlines and terrain features are aligned to the max extent possible.

NOTE

Due to differences in the publish dates of the maps, there can be some slight feature misalignment even when the Lat/Long or gridlines are properly aligned. When this occurs, the priority should be with lat/long or gridline alignment.

Step 2. Chum all the obstacles on the chart using ultrafine tip red marker.

Towers shall be marked in fine tip red marker with the elevation in feet AGL at the base.

Figure 1-2 Tower Elevation

Power lines shall be marked with in fine tip red marker.

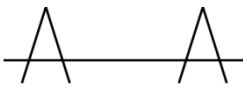

Figure 1-3 Power Line Marking

Use the Chart Updating Manual (CHUM), JMPS, VFR Sectional, JOG-A, and local instructions to update obstacles not that are not printed on the charts and maps.

The CHUM is a supplementary publication, with bulletins published quarterly, that can be consulted for the most current information on potential low level hazards (towers, power lines, etc.). The CHUM is available on the National Geospatial-Intelligence Agency (NGA) website. It is CAC enabled and requires registration https://www.extranet.nga.mil/servlet/RegistrationForm. Once you have obtained access, select "Products and Services" on the left side bar, then "AERO Products." The page will allow you to select a .pdf of the current CHUM publication, or select the current monthly ECHUM. The NGA Extranet site enables access to all electronic FLIP, from mission planning documents to approach plates. Access to this site will prove useful throughout your aviation career.

ECHUM can also be viewed in JMPS on the JOG-A map by going to the OVERLAY tab at the top of the graphical view. Halfway down the list is the Obstacle Change File (OCF) overlay which will display the latest changes to obstacles in the area. The changes will appear red on the map and will have an X through the obstacle if it has been removed, or just display the tower or object if it has been recently added. You can view how recently the OCF was updated via the system health check.

NOTE

All elevations on the 1:50,000 TLM are in meters and must be converted to feet.

Step 3. Plot the airspaces on the charts and maps.

Airspaces (Class "C") shall be marked in fine tip blue marker designating the boundaries of the airspace.

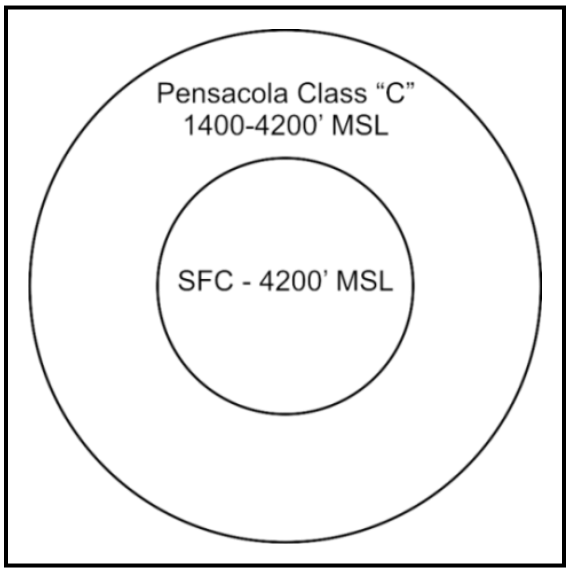

Figure 1-4 5 NM and 10 NM for JOG-A Chart Production

Prohibited Areas, Restricted Areas, and No-Fly Areas shall be marked in fine tip red marker designating the boundaries of the airspace with parallel lines through the middle of the airspace.

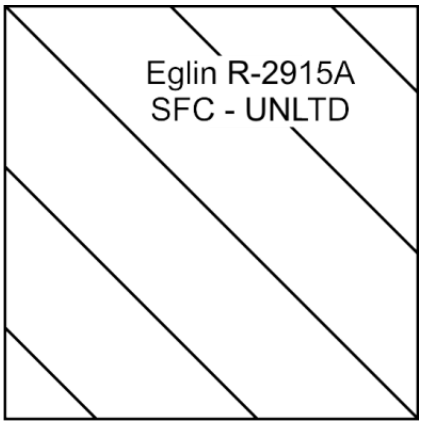

Figure 1-5 Boundaries of the Airspace

All airspaces should include the name of the airspace and altitude limitations to the max extent possible.

Step 4. Cut excess areas from the charts and maps.

The charts and maps should be cut to a manageable size, but not so small that important details are lost. A good rule of thumb for the topographic line maps is to keep **six** grid squares as a border between the checkpoints and the edge of the map. The six grid squares provide 3.6 miles of important terrain and manmade features that could assist in navigation if disoriented. Also, if the grid numbers are listed within +/- one grid, the grid numbers should be kept to assist with navigation. For JOG-A charts, leave enough map area for navigation and for orientation. Additionally, the chart or map should be cut in order to leave the grid numbers and lat/long information on the side. If doing so makes the chart or map size untenable, then the margin data should be written in using black marker.

Step 5. Place marginal information on the chart.

JOG-A

Front side – Scale shall be on the front of the chart in a location that does not cover other important details. The appropriate Low-Level Navigation Route Checkpoint Table shall be added from local SOP. Back side – All other information shall be added.

1:50,000 TLM

Front side – Scale and Magnetic Deviation shall be on the front of the chart in a location that does not cover other important details. The appropriate Low-Level Navigation Route Checkpoint Table shall be added from local SOP. Back side – All other marginal information shall be added. Only one legend is needed, but coordinate conversion

information, adjoining sheets, name, scale and addition (Crestview, Florida 3645 I V747 Edition 6-NIMA) should be placed on the chart for each map used.

NOTE

If using more than one 1:50,000 TLM chart and there is a discrepancy between the maps' marginal information, use the most current data.

Step 6. Place chart and map type, scale, route (if applicable), name, and date on the chart.

Do not cover up important terrain features. Over water is a good place to write this information, if able. If lamination is available, this information should be under the lamination.

JOG-A, 1:250,000:	1:50,000 TLM:
GREEN ROUTE	ORANGE ROUTE
PREPARED BY LTJG SMITH	PREPARED BY 1stLT JONES
7 JUL 15	7 JUL 15

Step 7. Use JMPS to plan the entire route of flight. Routes shall be planned using course rules from KNDZ or VFR departures from locations other than KNDZ or as directed by the IP. Airspeed for course rules shall in IAW RWOP. Airspeed on the navigation route shall be planned for 90 KTS ground speed. Twenty minutes of DLAs shall be planned at the LZ as applicable.

NOTE

In order to obtain accurate fuel planning from JMPS, adjustments in airspeed will have to be made in the Combat Flight Planning Software (CFPS). Aircraft configuration will have to be changed to calculated, required fuel at takeoff.

Step 8. Place the route CPs and LZs on the charts and maps. Plot CPs with the protractor and mark them with a circle. Route CPs are marked with a circle about the size of a nickel using a fine tip black marker. Course rules CPs are marked with a smaller circle about the size of a dime using a fine tip black marker. LZs shall be marked with a triangle using a fine tip black marker. The size of the triangle should be approximately the same size of the route CP circles.

Step 9. Connect the CPs with a single black line using a straight edge drawn from one CP to next CP as depicted below.

Figure 1-6 Route Checkpoints

Step 10. Label the CPs. Route CPs shall be labeled using the number of the CP and include brief description.

Step 11. Laminate (If available, not a requirement).

Step 12. Place map changeover points (MCPs) and LZs on the charts and maps as required. MCPs are marked with a square about the size of a quarter using a fine tip black marker with the letters "MCP."

LZs should be labeled LZ "name of the OLF or airfield," i.e., "LZ Bay Minette" or "LZ Harold."

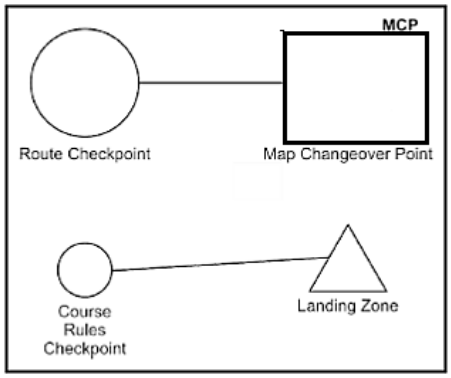

Figure 1-7 MCP & LZ

Mileage tic marks may be used to assist in range estimation while traveling along the course. A mark drawn to bisect the course line every one nautical mile works best. Mileage tic marks will help maintain orientation between CPs.

Time tic marks may be used to assist in dead-reckoning navigation as well. Use appropriate time intervals as required. The distance between the time tic marks is dependent on groundspeed and CP distance. Time tic marks help identify intermediate checkpoints and maintain timing to hit the assigned TOT.

While not required, it is highly encouraged to use tic marks to increase SA. SNAs may use mileage tic marks or timing tic marks at their discretion. Timing tic marks are typically used without the use of a NAVAID to provide distance to the next CP.

An intermediate CP is a landmark selected along the flight route used to verify position. An intermediate CP should be an easily recognizable feature or group of features. A lake, open

field, road intersection, and even towers may be used as intermediate checkpoints. They need not be directly on your ground track. For example, a large lake passing by the aircraft approximately 1 NM to the west can confirm your position. You may mark features on your charts and maps, however, too many markings will clutter the chart and may confuse you.

Step 13. Place doghouses on the chart. Doghouses should not be used for course rules to the route, only on the route itself. Place the doghouses between the appropriate checkpoints but be careful not to cover important features. Doghouses **shall** contain magnetic heading, distance between CPs, leg time, total time, fuel state and reverse magnetic heading. Grid magnetic angle must be converted to magnetic headings for the course. Use a fine tip black marker.

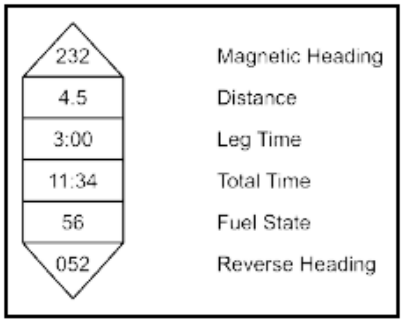

Figure 1-8 Doghouse

NOTE

Double dog houses for reverse routes are not authorized. The SNA shall add information for the reverse route in between the magnetic headings, extending the dog house size making sure not to duplicate Leg Time and Distance. The information should be oriented in the direction the route is being flown.

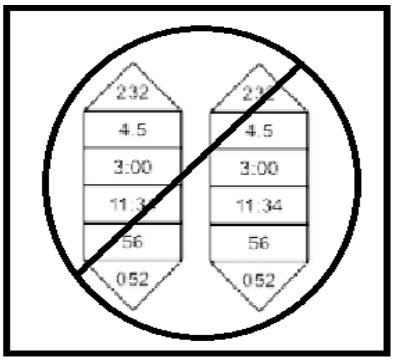

Figure 1-9 Double Doghouse

105. MISSION BRIEFING PROCEDURES

1. All operational missions are preceded with a mission brief. The brief can range from a very simple, short discussion to a complex multimedia presentation involving several different aircraft, combat elements and supporting elements.

2. The following is an example of a mission brief for the Low-Level Navigation syllabus. The format of the brief is the OSMEAC Format (Orientation, Situation, Mission, Execution, Administration and Logistics, Command and Signal). The Formation and Night Tactical Stages will use a similar, but more extensive form of this brief.

3. The briefing card (Figures 1-10 and 1-11) shall be used when briefing the Low-Level Navigation flights. The information does not need to be memorized word for word, but needs to be presented in the order below. The SNA can use the briefing guide as an aid during the brief but **shall not** read from a script. Information encapsulated by arrows (< >) is not covered in the brief, it is amplifying information of operational procedures.

4. The TW-5 Debriefing Card (Figures 1-12 and 1-13) is designed to identify overall briefing trends, but not to be used as a grading matrix. Route legs will not always have every navigational feature. There is no need to discuss a navigation feature for the particular leg if the feature is not applicable. A copy of the debrief card should be given to the SNA after the brief to allow the SNA to prepare for the next event.

Low-level Navigation Briefing Card

ORIENTATION

Time Hack
Aircraft Assignment _____ on Spot_____
Call Sign Eightball/Factory Hand/Lucky _____
Smartpack Inventory
Maps/Charts
Weather
Current _____
Destination _____
Required _____ SLAP_____

<SITUATION - N/A>

MISSION

At _____ L, HT-8/18/28 will launch a single TH-57C in order to safely complete a _____.

EXECUTION

CONCEPT OF OPERATIONS (GENERAL OVERVIEW)

Route
Control Measures
Boundaries
Airspace
Restricted Areas
LZ's
Obstacles to Flight
Avoidance, Powerlines, Towers, Aircraft, Birds

SCHEME OF MANEUVER

Preflight T-:30
Taxi T-:05
Takeofff T = ___
NASWF → ROUTE
ROUTE
F = Formation
A = Airspeed/Altitude
L = Lighting
C = Comms/Squawks
O = Obstacles/Terrain
Powerlines, Towers, Aircraft, Birds
N = Navigation/NVG
ROUTE → LZ
LZ description
SWEEP
LZ → NASWF

COORDINATING INSTRUCTIONS

Emergencies & System Failures
IIMC
Safe Heading_____
Safe Altitude_____
Disorientation Procedures

Figure 1-10 Low-Level Navigation Briefing Card (Front)

ADMINISTRATION & LOGISTICS

Flight Duration_____

Fuel

Mission_____gallons

Bingo_____gallons

COMMAND & SIGNAL

Communications

Preset/Manual Frequencies

Navaids

Lost Comms

ID and Recognition

Squawk

Figure 1-11 Low-Level Navigation Briefing Card (Back)

TW-5 STANDARD SNA TRF ROUTE DE-BRIEF CARD

- A copy or original shall be given to the SNA after the brief to allow the SNA to prepare for the next TRF brief.
- **The intent of this matrix is to identify overall trends, and not discuss every navigational feature on each leg, especially if not applicable.**

LEG 1 to…	2	3	4	5	6	7	8	9	10	11	12
HEADING	□	□	□	□	□	□	□	□	□	□	□
TIME	□	□	□	□	□	□	□	□	□	□	□
DISTANCE	□	□	□	□	□	□	□	□	□	□	□
FUEL	□	□	□	□	□	□	□	□	□	□	□
AIM POINT	□	□	□	□	□	□	□	□	□	□	□
INT CHK PT	□	□	□	□	□	□	□	□	□	□	□
FUNNELING	□	□	□	□	□	□	□	□	□	□	□
LIMITING	□	□	□	□	□	□	□	□	□	□	□
CONTOUR	□	□	□	□	□	□	□	□	□	□	□
TERRAIN	□	□	□	□	□	□	□	□	□	□	□
OBSTACLES	□	□	□	□	□	□	□	□	□	□	□
CHK PT IDENT	□	□	□	□	□	□	□	□	□	□	□

- □ Uses FTI Brief Card
- □ Time Hack > 1 min
- □ All charts visible
- □ CONOPS < 15 sec
- □ Boundaries (Whole AO)
- □ Obstacles (MSL/AGL)
- □ All LZs Mentioned
- □ T-times Used
- □ FAALCONN at T/O
- □ Road Terms – Hardball, etc.
- **OLF** →
- □ IIMC (SH:____, MSA:____)
- □ Disorientation Procedures
- □ Fuel (Mission / Bingo)
- □ Preset/Manual Freq.
- □ NAVAIDS (NAV 1,2 ADF)
- □ Lost Comm Procedures
- □ Squawks

OLF (SWEEP)
- □ Size/Slope/Surface/Suitability
- □ Winds/Loss of Wind Effect
- □ Elevation (MSL, PA, DA)
- □ Egress Route
- □ Power Req. vs Avail.
- □ OLF Scheme of Maneuver

- □ Fuel Card, if Req.
- □ Incorporates SLAP Data

- □ Addresses audience
- □ Pointer use (puts it down)
- □ Well-rehearsed

Figure 1-12 TW-5 TRF Debriefing Card (Front)

TW-5 STANDARD SNA TRF ROUTE DE-BRIEF CARD

Additional Notes:

Figure 1-13 TW-5 TRF Debriefing Card (Back)

ORIENTATION

Introduction – Introduce yourself and your event.

> *"Attention to brief. I am* (Rank & Last Name), *and I will be flying the TRF4001. Please hold all questions until the end."*

Time Hack – Obtain the accurate time prior to the brief from the Naval Observatory Master Clock by calling (202)762-1401, DSN 762-1401, or the Naval Observatory website.

Time Hack shall follow the below format:

"Orientation – Time Hack – In one minute the time will be 1545L."

"Thirty seconds to hack."

"Ten seconds to hack."

"5, 4, 3, 2, 1, hack. At the hack, the time was 1545. If anyone requires an additional time hack see me after the brief."

NOTE

While waiting on 1 minute to elapse, SNA may introduce him or herself and the event.

Aircraft Assignment

"We will be in aircraft_____ on spot_____."

Call Sign

"Our call sign today is Eight-ball/Factory Hand/Lucky (XXX)."

Smart Pack Inventory – Inventory is to ensure that all aircrew has the same information. Operational missions can require a single ship or a division of aircraft. The Smart Pack is essential to ensure all players have the appropriate call signs, squawks, frequencies, etc.

Inventory shall begin with the first page and continue in order to the last page. The SNA should provide the appropriate kneeboard card, TW-5 Debriefing Card, and completed weight and balance sheet to the instructor. Do not include these three pages in the smart pack.

NOTE

Page numbers shall be centered on the bottom and labeled, "1 of (X).'

Pen and ink changes should be avoided to the max extent possible but may be necessary. If it is not originally printed on the smart pack then a pen and ink change will be required and shall be briefed.

"Page one of X is the Cover Sheet. Page two of X is the route card starting at NAS Whiting Field and ending at CP3. Page three etc."

"Pen and ink changes are as follows…"

Maps and Charts – All charts and maps to be used on the route shall be inventoried.

"Map required for the flight is the Pensacola 1:250,000 JOG-A chart."

Weather – Obtain current and forecast weather prior to the brief and state required weather for the block of flight. If the flight is an NVG flight, include Solar & Lunar Almanac Planning (SLAP) data.

"Current weather is _____."

"Destination weather is _____."

"Weather required for the flight is 600-1, winds less than 35 knots."

SITUATION

Situation – For an operational mission brief, "SITUATION" is where the enemy and friendly situation is briefed. Normally, the enemy situation will be briefed by the intelligence department and friendly situation will be briefed by the operations department. **This section is not applicable and shall not be briefed.**

MISSION EXECUTION

Mission – A brief mission statement shall be made.

"Mission – At (Takeoff time) *L, HT-28 will launch a single TH-57C in order to safely complete a* (TRF4001)*."*

Concept of Operations – Big Picture. Give a general overview of the mission to provide a broad sweep of the operation, no longer than 15 seconds.

"Execution – Concept of Operations: We will launch from NAS South Whiting Field to fly the green route forward at 500' AGL, then conduct DLA's at LZ Site X. The flight will recover at NAS South Whiting Field."

Boundaries – Natural or manmade features that define the area of operation. Boundary considerations are:

1. Linear features, cardinal in direction (East/West/North/South), and easily recognizable.

2. Should include entire area of operation (consider including NAS South Whiting Field and appropriate NOLF's if able; additional techniques prescribe defining the Operational Area excluding familiar course rules and home field).

"Control Measures – Boundaries."

"The northern boundary will be…" SNAs shall brief boundaries and taking into consideration the boundaries found in local SOPs for the operating areas.

Airspaces – Describe the airspaces in the local area with dimensions and altitudes.

Class "C" – Give the feature that defines the center of the Class "C" (NAVAID, Lat/Long, etc.) and the dimensions of the airspace.

"Airspaces – Class 'C'. We have three Class 'C' airspaces in our area. The Whiting Class 'C' is centered on the Whiting TACAN (NSE). The Pensacola Class 'C' is centered on Pensacola International (KPNS) at Lat/Long (30° 28'N - 87° 11' W). The NAS Pensacola Class 'C' is centered on the Pensacola TACAN (NPA). All three have an inner core from the surface to 4200' MSL out to 5 NM radius and an outer shelf from 5-10 NM radius from 1400'-4200'MSL."

Restricted Areas – Describe the boundaries and altitude restrictions.

"Restricted Area – The Eglin Restricted Area R-2915A is located south of I-10 from the surface to unlimited altitude."

Prohibited Areas – Describe the boundaries and the altitude restrictions. Also included are No-Fly areas.

"Prohibited Area – No-fly zone in the…" SNA shall brief IAW local SOPs.

Obstacles to Flight – Provide a general overview of the obstacles in the operating area, along with avoidance procedures.

"Avoidance – We will maintain an active VFR scan and call out all obstacles using the clock method and state the action necessary to avoid the obstacle."

"Power-lines – There are multiple power lines running through the operating area today and should be crossed at the stanchion at the max extend possible."

"Towers – We will callout towers and voice which side we intend to pass it on, offsetting to avoid the towers and the guy lines."

"Aircraft – We will call at each checkpoint along the route of flight and coordinate as necessary to avoid other aircraft."

"Birds – We will make control inputs as required to avoid a bird strike."

Scheme of Maneuver – Brief the aircrew on the mission's entire conduct of flight from brief to landing. The scheme of maneuver should begin with a brief timeline and end when the flight has terminated. Takeoff time is represented by "T." Any time before Time "T" is "T minus (the time)" and any time after Time "T" is "T plus (the time)."

Preflight – Preflight should be conducted 30 minutes prior to the takeoff time. Be flexible, this might be adjusted as necessary by the IP.

Turn-up – For planning and briefing purposes, start-up 15 minutes prior to takeoff.

Taxi – For planning and briefing purposes, taxi 5 minutes prior to takeoff.

Takeoff – Takeoff time should be the time set on the flight schedule. Again, be flexible.

> *"Scheme of Maneuver – We will preflight at T minus 30. We will call outbound with Base on button X, get ATIS on UHF button #1, and call ground on button #3 to request taxi with the appropriate ATIS information. We will plan to taxi at T minus 5 for a 1500 takeoff. We will taxi single-ship to the appropriate spot as directed by ground. We will remain single-ship throughout the flight. Anti-collision lights – On, 70X in the TACAN, 0100 in standby in the transponder. Approaching the hold short line, we will switch button #4, South Whiting Tower, and inform Tower we are #1 holding short spot X for a Baker departure. Once cleared for takeoff we will complete the 4Ts and takeoff. We will climb at 70 KIAS to 900'AGL at which time we will accelerate to 100 KIAS and turn outbound to Pt Baker."*

NOTE

> Students shall brief the actual aircraft condition for the mission aircraft. If you are a hot seat, brief a timeline for a hot seat. Stating that you will conduct a preflight at T-30 is incorrect.

Route – The route brief shall include course rules to and from the route, low-level route, and transit to and from the LZ. Brief changes in airspeed, altitude, radio frequencies, and transponder codes at each applicable point along the route. A good technique for briefing these considerations is using the acronym "FALCON" (Formation, Airspeed/Altitude, Lighting, Communications/Squawk, Obstacles/Terrain, and Navigation/NVGs). While briefing each checkpoint, if any of the FALCON considerations have changed then they must be mentioned. If the FALCON considerations remain constant, only brief considerations that change. For example, at the beginning of the brief we state, *"We will remain single-ship throughout the flight."* Therefore, the brief may omit the "F" from the remainder of the brief and must only consider ALCON. **Omit any items that have already been briefed.**

Formation – If single-ship, state that the aircraft will remain "single-ship throughout the flight." For formation navigation syllabus events, brief the type of formation flight, such as cruise, parade, or combat cruise.

Airspeeds/Altitudes – If the airspeed and/or altitude change, brief the change.

Lighting – Brief the lighting scheme to be used during the flight IAW local SOPs.

Communications/Squawk – Brief changes in frequencies and squawks as applicable.

Obstacles – Any physical feature that might provide a hazard to flight. In this section, brief only the obstacle's location relative to the portion of the route being briefed. Brief the obstacles from big too small.

Power-lines – Wire hazards include power lines, communication wires, and cables used in transportation such as gondolas The safest place to cross is **at the stanchion,** particularly when unable to visually acquire the wires or when crossing wires strung across a valley or saddle. Visual clues to wire locations during flight are a swath through vegetation, poles and stanchions, and wires along roads, near towers and in the vicinity of buildings.

> *"Power-lines – Between CP1 and CP2 there is a northwest-southeast running power line. In the vicinity of CP5 and the town of Bay Minette, there is a north-south running power line. All power lines are 150' AGL or lower."*

Towers – Briefly describe the towers in the working area. Describe the towers using the height in AGL. If there are multiple towers in a specific area, state the highest of the group in AGL. If there are specific towers important to your conduct of flight, make sure to mention them (even if they are in a group of towers).

> *"Towers – There are multiple towers in the working area. Towers of specific note are as follows: the 1414' AGL tower just east of the town of Barrineau Park, multiple towers south of I-10 in the vicinity of CP7 the tallest of which is 1953' AGL …"*

Aircraft – Briefly describe potential aircraft hazards in the area including other training aircraft as well as potential transient aircraft.

> *"Aircraft – There will be other military and civilian fixed wing traffic operating in the area in addition to other helicopters."*

Birds – Describe the potential bird hazard in the area. Bring attention to areas with increased hazardous potential such as rivers, lakes, marshes, and trash dumps

Navigation – SNA shall brief each leg of the route to include the following:

a. Clock position turning to

b. Backup heading

c. Time (leg time and total elapsed)

d. Distance

e. Mission continuation fuel

f. Identify the next checkpoint

When briefing the route, ensure clock codes are given first and follow-up with a backup heading.

> *"Upon reaching CP 3, we will come left to the 10 O'clock position, back up heading of 320, for a distance of 5 miles, a leg time of 3 minutes and 20 seconds and total time of 7 minutes and 14 seconds. Continuation fuel is 32 gallons. CP 4 is identified as a "T" intersection of a north-south running hardball road and an east-west running railroad."*

Use limiting features, funneling features, aim points, and intermediate points to highlight key aids to navigation along the route so all aircrew are aware of them.

When describing roads, use the physical feature of the road instead of the legend term. In the legend on the chart, roads are usually described as "Primary" or "Secondary" roads. This description stems from the volume of traffic on the roads and not necessarily the type of road.

As aviators, it is more useful to use the physical description of the road itself. Roads fall into one of four categories: all-weather or hardball, improved surface, unimproved surface, and jeep trails.

1. All-Weather or Hardball - Concrete or asphalt.

2. Improved Surface – Leveled and packed down with improvements such as culverts and bridges. Not paved.

3. Unimproved Surface – Loose surface.

4. Jeep Trails – Tracks going through the woods.

NOTE

> There is a difference in the depiction of roads on the JOG-A and the roads on the 1:50,000 TLM. Jeep trails will not be shown on the JOG-A. The smallest roads depicted on a JOG-A will be unimproved surface roads.

NVG considerations for each segment of flight shall be briefed for NVG syllabus events. These considerations shall include, but are not limited to, cultural lighting, environmental conditions, relative moon position, shadowing, etc.

ROUTE→LZ – The specific route of flight from the last checkpoint to the LZ shall be briefed in detail ending with the LZs arrival point. It is not acceptable for the SNA to simply state, *"We will fly from CP10 to Site X."* The course rules shall include, but are not limited to, time, distance, heading, airspeed and altitude.

LZ - Brief the terminal procedures on how to enter the landing pattern, and the planned sequence of events.

> *"At Pt. Racetrack we will call LZ Harold on button #12 and report inbound. We will*

follow course rules by flying over the power lines and split the field for the appropriate course in use. We will conduct DLAs for 20 minutes."

In addition, brief the LZ utilizing the "SWEEP" format.

"LZ Site X is roughly a thousand foot by thousand foot grass field. There is slope on the southeast corner and we will avoid conducting DLA's in that area. The LZ is suitable for a single TH-57. Winds are expected from the NE at 15 knots. The LZ is 159MSL. Our egress on a waveoff is straight ahead, with departure egress in the SE corner. Our power required at the LZ is calculated as HIGE of XX% and HOGE of XX%."

During some syllabus events, the LZ might be an airfield. In this case, the SNA shall brief the plan to enter the field for the planned runway in use.

"At checkpoint 2, we will turn to the 2 O'clock position for a heading of 348, distance of 10.5NM and timing of 6 minutes, 48 seconds for Atmore Municipal. We will make a call on button #19, Western Area Common, that we are off the route inbound for Atmore, then make a 10 mile call inbound to Atmore on VHF frequency 122.8. We will then make a five mile call to Atmore traffic. With winds out of the south, we will plan to enter a left downwind for runway 18 at Atmore. We will conduct one normal, and one steep. Atmore is SWEEPS."

LZ→KNDZ –- Specific course rules from the route shall be briefed in detail starting at the departure corner and ending at the NAS South Whiting Field VFR entry point. It is not acceptable for the SNA to state, *"We will fly course rules from Site X to South Whiting."* The course rules shall include, but are not limited to, time, distance, heading, airspeed and altitude.

NOTE

SNA should plan for de-confliction measures between other training areas and course rules traffic while transiting to and from the route. SNA should determine how many other aircraft are expected to be in the area and at the LZs. This enables the members of the flight to have higher SA about the expected working area and LZ traffic.

Contingencies – Contingencies are the immediate actions in the event the conduct of flight deviates from the Scheme of Maneuver. Brief these considerations regarding the low-level route, as they will be different from other phases of flight. This is a mission brief, not a NATOPS brief. The NATOPS brief (by exception) is briefed after the mission brief and will include how to handle the cockpit in the case of emergencies.

Emergencies and System Failures

"Coordinating Instructions – Emergencies and System Failures – If we have an emergency or system failure during the flight, we will handle it in accordance with NATOPS. We will always endeavor to turn a flying emergency into a ground emergency."

Inadvertent Instrument Meteorological Conditions (IIMC) – Brief a plan on how to handle this emergency. Study the charts and maps to find the highest obstacle in the area taking. Add a minimum of 200' to the height of the obstacle in MSL and designate a Minimum Safe Altitude (MSA) for the route. Then determine the cardinal direction that leads away from the majority of obstacles and clear of all airspaces. Designate this as the Safe Heading (SH). More than one SH is necessary at different phases of the flight; however, assigning too many will be ineffective. Additionally, study the charts and maps to determine the proper controlling agency to contact if IIMC is encountered.

"IIMC – IIMC is an emergency. If we go IIMC, the PAC will switch to an instrument scan, level the wings, level the nose, center the ball, and start a standard rate climb to the established MSA and execute a standard rate turn the shortest direction to the SH. PNAC will squawk 7700, dial up 124.05 Eglin Approach in the VHF, request handling, and a discrete squawk for an approach back to (KNDZ or appropriate airfield). If we regain VMC, we will remain VMC."

Lost Communications – As a crew, determine the appropriate course of action for the route flown and the appropriate landing area. If returning to NAS South Whiting Field, comply with the local lost communications SOPs.

"Lost Communications – If we experience a total radio failure, we will climb to a safe altitude to gain altitude separation from other route traffic and troubleshoot. If unable to regain radio communications, we will maintain VMC, squawk 7600, make all calls in the blind. We will intercept course rules to NAS South Whiting Field. Once at NAS South Whiting Field, we will overfly the field with navigation lights in flashing bright, determine the course for the runway in use, and look for an Aldis lamp signal from the tower."

Disorientation Procedures

"Disorientation Procedures – If we become disoriented on the route of flight, we will attempt to identify a known reference point. Options include: climbing, orbit or hold until reoriented, or return to the last known checkpoint and continue the flight."

ADMINISTRATION & LOGISTICS

Administration & Logistics – Any considerations concerning the basic logistics for the flight.

Flight Duration – The total flight time shall be calculated using JMPS and will be briefed appropriately.

"Administration & Logistics – Flight Duration will be 1 hour and 33 mins."

Fuel – Two fuels are calculated.

Mission Fuel

"Fuel – Mission Fuel is XX gallons."

Bingo Fuel

Bingo fuel is calculated using the appropriate NATOPS charts. The SNA is required to do detailed chart and map study and calculate a bingo to an appropriate fuel source.

"Bingo fuel is XX gallons for a VFR arrival at (applicable fuel source) within NATOPS mins."

"We will depart the LZ with ____ gallons or a steady low fuel light."

COMMAND AND SIGNAL

Communications

Frequencies – Brief frequencies for controlling agencies, CTAFs, and those listed in local SOPs.

"Command and Signal – Communications – Preset and Manual frequencies will be as required. Additional VHF frequencies for today's flight will be 124.85 Pensacola Approach, 124.05 Eglin Approach when on the Purple Route and 121.95 Instructor Common."

NAVAIDS – Brief all NAVAIDs to be used throughout the flight and ensure they are plotted on charts and maps.

"NAVAIDs – Today on the Purple Route we will be primarily using visual navigation. We can use Crestview VORTAC 106X/115.9 for reference. Also, the Purple Route will be loaded in the GPS for backup as required."

ID and Recognition

Squawk – Review all squawks to be used.

"ID and Recognition – Squawk – We will squawk 0100 outbound to Pt Pond. At Pt Pond, we will squawk the Western Operating Area code of 4777. At the Welcome Station, we will

squawk 1200 inbound to Site X. We will squawk 0400 inbound on course rules to NAS South Whiting Field."

Additional Mission Brief Considerations

1. Face and address the audience, not the charts and maps.

2. Practice pointer use for the brief, and put the pointer down when it's not in use.

3. Rehearse, rehearse, and rehearse. Be prepared and practice with other SNAs.

4. Avoid filler words such as: "Umm," "uh," and "like."

106. NATOPS BY EXCEPTION BRIEF

The NATOPS By Exception Brief covers items such as aircraft emergencies and system failures, cockpit crew coordination, and items not specifically addressed in the mission brief.

107. LOW-LEVEL NAVIGATION EXECUTION

SNAs must develop a systematic approach to navigation. The 6Ts is a recommended technique. At each checkpoint, the PNAC verbalizes each step. The PAC is responsible for avoiding obstacles and controlling the aircraft and is primarily on an outside scan.

Execution – 6Ts

1. ***T = Time***

When the PNAC has the checkpoint in sight, he should reset the 8-day clock. Inform the PAC the checkpoint is in sight and the next direction of turn.

"McDavid intersection is off the nose. McDavid is the intersection of Hwy 29 running north-south and the hardball road coming in from the West. There is a tower on the northwest side. At McDavid, we'll be coming right to 2 O'clock."

2. ***T = Turn***

Advise the PAC the direction to turn clear left and right.

"Come right to 2 O'clock, I will call your rollout. Clear right"

PAC turns toward the assigned clock code, PNAC calls the roll out based on the backup heading. PNAC refines the heading based on winds and ground track. Remember that the **backup heading is for PNAC reference only, the PAC is 100% on an outside scan**. PNAC **shall** give the PAC an aim-point to fly toward.

"Rollout. Aim down the right side of the catfish ponds."

An aim point is given so the PAC can scan outside and stay clear of obstacles or terrain. It can be a natural or manmade feature. SNAs may use a "target talk-on" to talk the PAC onto their chosen aim-point or CP. Start big and work small, choosing a large, easily identifiable feature near the point and describe it to the PAC. Once the PAC verifies they have it in sight, PNAC will call out a smaller feature, closer to the point. Repeat this process until the PAC verifies sight of the aim-point or CP.

"Rollout. Aim to fly over the fishponds at the 12 o'clock. At the 11:30 there are two white grain silos, call contact. Just in front of those silos are train cars that mark the railroad tracks, call contact. Follow those railroad tracks to the right, where they meet the road coming from the right. Where those intersect is your checkpoint."

3. ***T = Time***

Once rolled out, start the 8-day clock for leg time. Note the actual total time on the ADF and compare to the planned total time.

4. ***T = Transition***

Confirm airspeed, altitude, NAVAIDs, squawks and adjust as required. PNAC informs the PAC of adjustments in altitude and airspeed as well as changes to the NAVAIDs and transponder code if necessary. Note fuel state and compare with planned fuel.

5. ***T = Twist***

Twist the backup heading in the HSI.

6. ***T = Talk***

PNAC give gas and gauges check.

PAC makes proper external traffic call.

"Gauges checked normal. We have 45 gallons."

"Lucky 066, CP 1 to 2"

SNA needs to consider fuel status and determine if the aircraft is on track with mission fuel or if the aircraft is getting close to BINGO fuel and then determine how to proceed.

Use of GPS

The GPS is an excellent tool for navigation. In some areas of the world where terrain features are limited, or over water, it may be your best or only source of information, but it has

limitations. If satellite reception is inadequate, control points are programmed incorrectly, the GPS receiver fails, etc., the aircrew must rely on navigation skills. Use of GPS for training flights is at the discretion of the PIC.

Navigation Parameters

The low-level navigation flights are designed to introduce the aviator to navigation at 500 feet AGL and below on large-scale maps.

The SNA shall maintain orientation along the route and with each CP. Airspeed should be adjusted accordingly to maintain orientation and timing as required. In the event the aircrew becomes disoriented, a climb to a minimum of 500 feet AGL is required until established back on the route.

NOTE

During operational missions, disorientation procedures will change based on a variety of factors including threats in the AOR.

The SNA shall be **+/- 2 minutes** of timing starting from the first CP and ending with the last CP. Adjusting airspeed, delaying time to CP, and holding are permitted to meet timing. With sufficient time and CPs remaining, adjusting airspeed is the preferred method to get back within the 2-minute time constraint. If the SNA recognizes that adjusting airspeed alone will not allow sufficient time to get within parameters, the SNA can request a ROLEX and the IP can elect to extend the overall route time.

"Sir, request ROLEX, PLUS 2 mins."

Fuel Checks and Calculations

At each checkpoint, SNA shall assess fuel on board compared with fuel required to complete the route and bingo fuel. There are two ways of presenting the fuel on board: gallons or time. Both have useful applications, and both are important for overall fuel management.

When conducting fuel checks in flight, use the fuel quantity in gallons to compare with the fuel required to continue the mission from your route card. With less fuel on board than is required from your detailed mission planning, adjustments to the route or the time in the TA must be made.

SNA shall notify IP when actual fuel differs from the planned mission fuel or when reaching the bingo fuel with instructions for proceeding VFR to a fuel source.

"Sir, we have 45 gal, I calculated required mission fuel as 55 gal, we need to cutout DLA's to complete the route."

"Bingo fuel is 35 gallons. Current fuel is 40 gallons, I recommend we turn left to 165 and proceed to LZ Site X."

Fuel may also be converted from gallons to time and may be used to estimate time left on station.

"Sir, fuel quantity is 41 Gallons, BINGO fuel is 15 Gallons, and we have 1+00 remaining until BINGO."

Route Timing

Total route time will be calculated in JMPS during pre-mission planning. **TOT timing starts at the first CP on the route and ends at the last CP.**

Overall route timing should be monitored using the ADF. Leg time should be kept on the 8-day clock with the sweep hand timer.

SNAs must monitor route time and leg time at each checkpoint to ensure proper groundspeed is being flown. Head winds and tail winds can effect on groundspeed. Winds are briefed in the mission brief but must be assessed real-time early in the route.

If you are behind timeline and cannot arrive at the TOT, SNAs must coordinate with the IP for permission to ROLEX to a new time. If ahead of timing along the route, you may adjust groundspeed or to hold at a checkpoint prior to the objective area.

If a ROLEX becomes necessary, the SNA must estimate a new TOT and request a ROLEX for the new TOT from the IP. For example, "*Sir, request ROLEX 3 minutes."* Approval of ROLEX will be at the discretion of the IP. ROLEX should not be used to correct for wind effects. Proper weather planning and execution is required.

108. TERRAIN FLIGHT

Application

1. TERF is flight at or below 200 feet AGL. The purpose of TERF is to utilize terrain, vegetation, and manmade objects to enhance survivability by degrading the enemy's ability to visually, optically, and/or electronically detect or locate the aircraft.

2. TERF is flying close to the earth's surface using low-level, contour, or Nap Of the Earth (NOE) techniques to prevent or counter an enemy's capability and efforts to acquire, track, and engage the aircraft. Three types of terrain flight are:

a. **Low-level** flight is flown at a selected altitude at which detection along the route is avoided or minimized. The flight route is pre-selected and flown at a constant airspeed and indicated altitude.

b. **Contour** flight is flown at low altitude conforming to the contour of the earth's surface. It is characterized by varying airspeed and altitude as terrain and obstacles dictate. Minimum recommended altitude for contour flight is 50 feet AGL.

c. **NOE** flight is flown as close to the earth's surface as terrain and obstacles permit. It is characterized by varying airspeed and altitude as influenced by terrain, weather, ambient light, and enemy situation. Typically airspeed varies from 0 - 40 knots and altitude varies from 10 - 50 feet above terrain.

Of the three modes of terrain flight, low-level flight is the least crew intensive. Contour and NOE provide certain threat avoidance advantages over low-level but are significantly more challenging and will not be flown in the advanced rotary syllabus.

Additional Low-Level Considerations

Crew Resource Management (CRM)

CRM is paramount for safe and effective TERF. It is used to establish individual pilot responsibilities and to organize cockpit duties.

a. The PAC has two primary responsibilities: controlling the helicopter and avoiding obstacles. During low level flight, aircraft control is critical due to terrain and hazards associated with the low altitude. The PAC must keep their scan outside the helicopter to avoid hazards. They should report terrain and landmark information to the PNAC to assist with navigation. PAC retains control of the helicopter during aircraft or system emergencies and completes the critical memory items requiring flight control input in accordance with the NATOPS brief.

   The PAC will follow directions from the PNAC and assist in actively searching for features and intermediate CPs along the route **as directed by the PNAC**. Upon identifying a landmark called out by the PNAC, the PAC will promptly identify it by direction and distance.

b. PNAC is primarily responsible for accurate navigation. PNAC must remain oriented at all times, monitor cockpit instruments and perform assigned duties as briefed. During an aircraft or system emergency, PNAC executes the critical memory items not requiring flight control input in accordance with the NATOPS brief. The PNAC must be proficient in chart and map reading, terrain interpretation, and correlating terrain features with map symbols. PNAC must continuously integrate cockpit instrumentation (heading, airspeed, and timing information) with map and geographic information to maintain SA and orientation

   The PNAC should relay information and directions to the PAC to enable the PAC to maintain an outside scan. PNAC shall direct the PAC with aim-points, altitude, and airspeed changes.

It is important that both pilots not focus only on close features, but scan from the bigger, broader terrain features to the smaller, more precise terrain features. Keep your scan out far for easily identifiable features and work your way closer to the aircraft.

NOTE

Maps and charts may not always depict features accurately. For example, routes that are flown after periods of drought or heavy rains may have water features, or lack thereof, that are drastically different from the depiction.

109. DEBRIEF

A thorough debrief shall be conducted at the completion of every flight. All participating aircrew should meet at a designated location and time to discuss the successes and failures of the flight. The discussion is led by the Mission Commander and should be debriefed by phase (Planning, Brief, Execution). The debrief should be held as close as possible to the completion of the mission in order to preserve as much information as possible. The critiques of the mission should start with something positive and then move into the mission failures. All aspects of the flight should be covered.

In the training environment, the IP shall debrief the SNA's event planning and event brief prior to the flight. This debrief should cover chart and map preparation as well as delivery and content of the brief. The execution of the flight shall be debriefed at the completion of the flight IAW local SOPs. This will facilitate the SNA receiving an honest critique of the entire flight and guide the IP in conducting a standardized debrief.

CHAPTER TWO
DAY NAVIGATION STAGE

200. INTRODUCTION

VFR navigation flights are intended to be cross-country flights to familiarize the pilot with techniques and procedures of helicopter dead reckoning (D/R) navigation and pilotage away from the familiarity of course rules.

201. GENERAL

D/R navigation is the method for determining position by means of a heading indicator and calculations based on speed, elapsed time, wind effect, and direction flown from a known position. Pilotage is a method of determining a position over the ground using map-to-ground orientation.

Crew Resource Management

1. PAC verbally describes topography and landmarks while on route. (Communication)

2. PNAC performs "Groundspeed and Fuel Checks." (Situational Awareness)

3. PNAC properly performs navigation and CP procedures. (Mission Analysis)

4. PNAC provides position updates to PAC while on route. (Communication)

202. PREPARATION FOR FLIGHT

In preparation for the flight the pilot will perform the following tasks:

1. Attend the appropriate phase lecture.

2. The route of flight shall be drawn out on the sectional chart. The flight path should be relatively straight, using prominent landmarks as fixes when changing direction and for time distance checks. The pilot should be familiar with all the markings on the sectional chart, minimum en route altitudes, airspace information, and general VFR procedures.

3. Two complete flight logs should be prepared after a current weather brief, allowing for magnetic variance and the winds aloft.

4. Two copies of the DD 1801 VFR flight plan will be completed.

5. The weather must be forecast to be VFR for the entire route for the duration, plus or minus one hour. The SNA will personally obtain a weather brief and complete two copies of the DD 175-1.

6. Time distance checks should be made at each CP and fuel checks computed at least once on each leg of the flight.

203. DAY NAVIGATION SOLO GUIDELINES

Preflight Preparation

Plan for cruise airspeed to be between 90 and 100 KIAS.

FDO/ODO Brief and flight plan and Weather Brief approval

Submit a copy of the DD 1801 flight plan, DD 175-1 weather brief, and weight and balance to the FDO/ODO for review and approval. Retain a copy of these items and place them in your flight suit. Listen intently to the FDO/ODO's instructions, and if you have any questions ***do not hesitate to ask!*** If you are confused about the NOTAM abbreviations, ask the FDO/ODO before you file and fly to a closed airport!

Ensure you have:

1. Fuel Packet

2. Appropriate VFR publications for route of flight

3. NATOPS

4. Flight Plan, Weather Brief, and Flight Logs

5. Checked NOTAMS (PPR number, if required)

6. Received FDO/ODO Brief

7. Wallet/ID Card

Aircraft issue

Ensure your aircraft has no downing discrepancies against the transponder or numerous repeat gripes against the UHF radio. If so, advise the FDO/ODO and another aircraft will be issued. These items are important to you in the event an actual emergency occurs. The SNA PIC will sign for the aircraft. Whoever is functioning as the PIC shall sit in the right seat, start the aircraft, take off, and land.

Preflight

If you are unsure of any discrepancy on preflight, **ASK!** Ask a nearby IP, use the “T” to call a troubleshooter, or call your FDO/ODO desk.

2-2 DAY NAVIGATION STAGE

Prior to Takeoff

Call "Out" with the FDO/ODO on squadron common and if applicable, call WHITING METRO, and extend your DD 175-1 VOID time if your actual takeoff time will be greater than 30 minutes after your proposed takeoff time. As a matter of courtesy, have your weather brief number readily available.

Turn your position lights STEADY BRIGHT and inform ground of your intention to taxi by saying, "South Whiting Ground, (call sign), solo, taxi, VFR, (destination)."

Weather Criteria

DAY NAVIGATION SOLO weather criteria is 1500/3. This applies to your departure field, en route, and destination forecast. If the weather forecaster suggests an alternate to you, advise the FDO/ODO *immediately*. If your en route weather deteriorates below 1500/3 because of an isolated thundershower or smoke, you may circumnavigate that area and continue on course. However, at no time will you lose basic VFR minimums of 1000/3. If you are unable to remain 1500/3 continuously or circumnavigate isolated weather, return to the last airport from which you took off. Advise FSS of your intentions so that they may inform your destination of your decision to turn around. ***Under no circumstances will you operate the aircraft below 1000/3 (VFR minimums)***. Special VFR minimums with which you are familiar only pertain to the Whiting Field Control Zone.

En route Procedures

Monitor squadron common within 40 miles of home field if not already assigned a frequency on UHF. If you are going to TYNDALL via the beach, this will not apply since you will be under radar contact/positive control by Eglin approach. At other times, monitor FSS.

If you are transiting along the beach, do not fly or be vectored more than ***½ mile*** (autorotative glide distance) from the beach. When transiting over open areas of water, always pick the shortest distance from land mass to land mass.

At no time will you descend below 1000 feet (unless under positive control or preparing to land). ***Do not flat hat!*** "Flat Hatting" is flying at low altitude and/or a high rate of speed for thrill purposes. Remember, when dealing with controllers tell them who you are, where you are, and what your intentions are. If you do not understand something you are told, ASK for clarification.

En route Emergency Procedures

During the NATOPS brief with your co-pilot, clearly delineate the duties each of you will perform in the event of an actual emergency. A vast majority of the actual emergencies encountered by DAY NAVIGATION SOLO SNAs are single instrument indications or caution lights.

WARNING

Do not enter an autorotation for a single instrument indication or caution light. Ensure the twist grip is in the full open position throughout the entire approach.

Listed below are the duties the pilot and copilot perform:

1. Pilot duties:

   a. First and foremost – ***Aviate! Fly the aircraft***.

   b. Advise copilot of your intentions (degree of urgency in landing and choice of landing site).

   c. ***Communicate!***

      Communicate with your copilot. Plan the final approach into the wind whenever practical. If landing near populated areas, be especially vigilant for power lines or telephone lines on final.

2. Copilot Duties:

   a. Switch UHF to GUARD XMIT.

   b. Squawk 7700.

   c. Broadcast appropriate emergency call.

   d. Perform LANDING CHECKLIST.

   e. Assist pilot as requested and ensure NATOPS procedures are followed and performed.

3. In the event an actual emergency occurs, regardless of where you are on your route of flight, switch to GUARD XMIT on the UHF, squawk 7700, and declare an emergency (RADAR environment), or MAYDAY (non-RADAR environment), (CALL SIGN), (position), (intentions and nature of emergency), will report safe on deck." For example:

   "[Controlling Agency], (CALL SIGN) is declaring an emergency, 2 miles north of Barin Field, landing with an engine chip light, will report safe on deck."

Listen for interrogations by ground stations or other aircraft and answer their questions, time permitting.

Perform a LANDING CHECKLIST and specifically note the position of the TWIST GRIP.

2-4 DAY NAVIGATION STAGE

If the emergency is other than a single instrument indication or caution light, utilize the NATOPS CHECKLIST and review the procedures with the pilot. Ensure they are done correctly.

4. After the rotors have come to a complete stop:

Exit the aircraft and turn the blade clockwise for ***two*** complete revolutions. Tie down the blade and perform a post flight inspection. Disconnect the battery and install the engine inlet and exhaust covers. Leave one person with the aircraft, while the other goes to contact the squadron by telephone.

This discussion cannot cover every possible emergency situation, and as such, LOST COMMUNICATIONS or LAND AS SOON AS PRACTICABLE emergencies are left up to the pilot's headwork and common sense.

At Destination

Before landing, ensure you know the wind direction. **Do not let the transient line personnel land you more than 45º out of the wind line or taxi you too close to an obstacle or other aircraft**. After shutdown, perform a good post-flight, turn the blade two times clockwise, tie down the rotor blade, and secure all your panels, windows, and doors.

Refueling

Ensure you get your credit card back and a copy of the receipt marked "CUSTOMER." Note to see if blocks 25 - 29 have been filled in with the approximate amount of fuel you expected to receive. Visually check your fuel level and ensure the cap is secure. Complete the summary sheet included in each fuel packet after returning to NAS Whiting Field.

Ground Time

Plan for one hour. Close out your flight plan and ensure your return leg is filed. Check with weather to ensure your return leg is still >1500/3. No DD 175-1 is required.

Maintenance. If your aircraft requires fluid servicing, ask the transient personnel to provide the fluids IAW the NATOPS. Consult your NATOPS for NATO compatible numbers if required.

a. ***MIL-L-7808 may not be mixed with MIL-L-23699.*** MIL-H-5606 may be mixed with MIL-H-83282A if it is the only hydraulic fluid available. Be sure to call the FDO/ODO prior to adding any oil or fluid which is not MIL-L-23699 or MIL-H-83282A.

b. If any other problems are encountered, call the FDO/ODO from BASE OPERATIONS.

Preparing for Start

Ensure the grounding wire has been removed from your aircraft. Ensure all your panels are closed and servicing caps secured. ***The transient personnel will not do a walk around inspection of your aircraft!***

Upon Return

Log your NAVFLIR in maintenance control, dividing the flight time as necessary between first pilot time and copilot time. Return all items you checked out. If you encountered any unusual circumstances during the flight, please debrief them with the FDO/ODO.

Restrictions

Solo SNAs are specifically prohibited from performing running landings, full autorotation, simulated engine failures, boost-off flight, simulated tail rotor malfunctions, 180º autorotations, no-hover landings, simulated emergencies, maximum load takeoffs, and the carrying of passengers.