



# NATIONAL INFRARED OPERATIONS GUIDE



**NATIONAL INFRARED OPERATIONS GUIDE**  
**NATIONAL INTERAGENCY FIRE CENTER AND INTERMOUNTAIN REGION**  
**FIRE AND AVIATION MANAGEMENT**

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## CHAPTER 1 - INTRODUCTION

### 1.1 INTRODUCTION

This guide provides information to those who are responsible for the collection of fire imaging data and to those who use the US Department of Agriculture Forest Service (FS) Fire and Aviation Management (FAM) National Infrared Operations (NIROPS) program. The purpose of this document is to provide users with a source for information concerning national infrared applications, organization, mobilization, and operations. This guide describes the standards and procedures associated with national infrared support available to interagency cooperators engaged in the detection and suppression of wildfires on public and private lands.

### 1.2 OBJECTIVE

The objective of this guide is to facilitate effective use of the infrared (IR) services available to fire management personnel.

### 1.3 AVAILABLE INFRARED LINE SCANNERS

Descriptions of the available types of infrared (IR) capabilities are provided here as an aid for selecting the best type for various situations. This guide provides an overview; more detailed information can be found in the Infrared Field Users Guide referenced in Appendix C.

#### 1.3.1 FOREST SERVICE

The US Department of Agriculture Forest Service (FS) currently owns four infrared line scanner systems. There are two Phoenix Infrared Digital Mapping Systems and two Daedalus systems. These systems can be installed in either of the two infrared platforms: the Super King Air B200 or the Citation Bravo Jet. These systems can detect hot spots that are 8 inches in diameter and 100 degrees Celsius greater than the background terrain temperature from an altitude of 14,000 feet over the terrain.

The Phoenix systems have the ability to downlink images through the Aircell telecommunications system. Aircell provides high bandwidth data downloads with nationwide coverage for a monthly subscription fee.

The Phoenix systems have a 120-degree field-of-view. They are useful for virtually all sizes of fires and fire complexes, or for wide area detection missions. The output of the Phoenix system is ortho-corrected imagery of the area covered, mission data stored on a CD or USB drive, and a Geographic Information System (GIS)-compatible shape file showing points of heat that

exceed an operator-set threshold.

The Daedalus system has an 86-degree field-of-view and is capable of outputting a thermally depicted digital image on hardcopy only.

### **1.3.2 COMMERCIAL VENDORS**

Please see Appendix C for commercially available systems.

## CHAPTER 2 - ORGANIZATION

### 2.1 INTRODUCTION

This chapter deals with the organizational and functional structure of the NIROPS program. It includes national, regional, and interagency position descriptions and their responsibilities. These positions are essential to effectively integrate this program's valuable but limited resources.

During a fire season when the National Preparedness Level reaches PL4 (typically when two aircraft are flying multiple missions per night), an Infrared Coordinator National (IRCN) position is assigned by the National Interagency Coordination Center (NICC) Director. The NICC is located in Boise at the National Interagency Fire Center (NIFC). The IRCN coordinates the activities of all the infrared line scanning aircraft, including contract aircraft and infrared aircraft contracted by other agencies. This does not release the IR Coordinators Regional (IRCR), if assigned, from their infrared management duties, rather it alters the way these duties are carried out, as discussed in sec. 2.4.1f.

#### National Interagency Fire Center Member Agencies

- Bureau of Land Management
- Bureau of Indian Affairs
- U.S. Fish & Wildlife Service
- National Park Service
- US Department of Agriculture Forest Service
- National Oceanographic & Atmospheric Administration
- DOI Aviation Management
- Federal Emergency Management Agency
- National Association of State Foresters

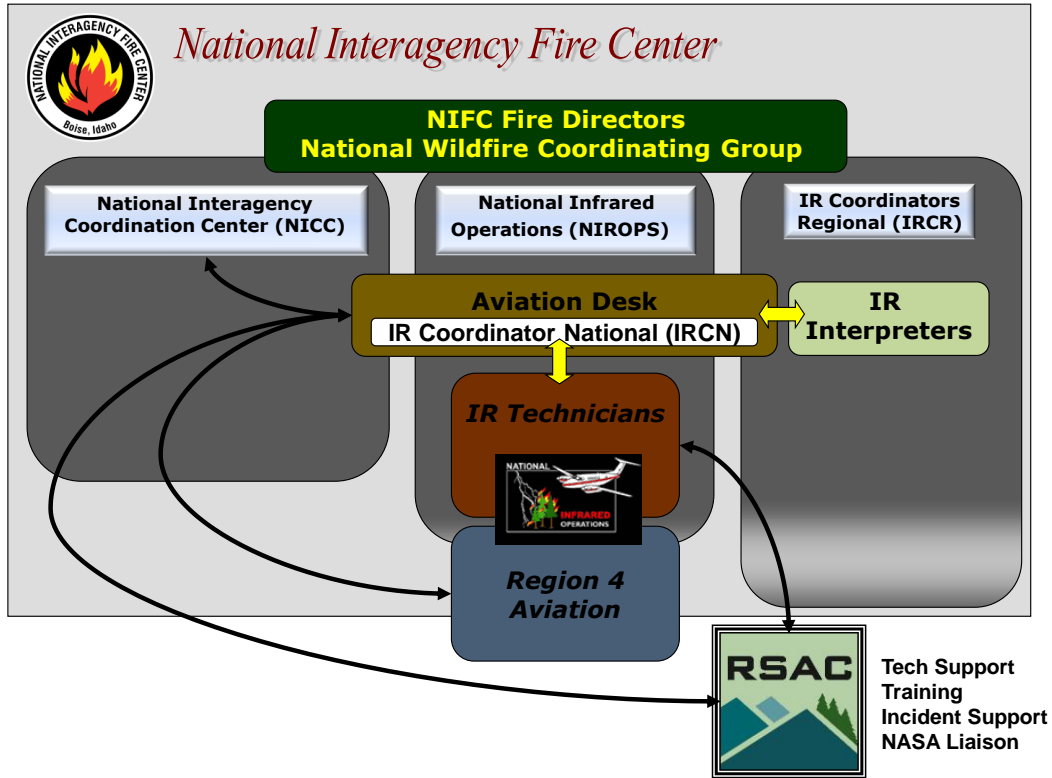


Figure 1: A diagram illustrating the interrelationships that support the NIROPS program throughout the fire season. The arrows indicate lines of communication.

## 2.2 OBJECTIVES

Per Forest Service Manual 5704.2, item #12, “The Washington Office of Fire and Aviation Management has the responsibility to provide an aerial infrared remote sensing service.” The National Infrared Operations Program meets this responsibility with the following objectives:

1. To provide infrared support and service to federal, state, tribal and local agencies engaged in the detection and suppression of wildfires on public and private lands.
2. To provide infrared support for fire management agencies and their cooperative partners, as applicable.
3. To provide international wildfire mapping support as requested and available.

## 2.3 RESPONSIBILITY

Four units work together to provide infrared scanning service to the fire community: the NICC; the National Interagency Incident Communications Division/Branch of Infrared (see sec. 2.3.2); the Intermountain Region (Region 4) Aviation - Infrared Operations Group, and the Remote Sensing Applications Center (RSAC).

The direct oversight and management of the NIROPS program is provided by the National Interagency Incident Communications Division/Branch of Infrared, located at NIFC. The daily coordination of the NIROPS program is quite complex as illustrated in figure 1 above.

The FS Fire Imaging Steering Committee (FISC) provides program oversight under the direction of the Director of FAM. The committee is made up of personnel from the Washington Office, Fire & Aviation Management; RSAC; the National Incident Management Team Planning Section Chief, and an interagency fire and aviation cooperator (Department of the Interior).

Responsibilities are shared as follows:

### **2.3.1 National Interagency Coordination Center**

1. Provides infrared coordination and prioritizes requests by the incidents with input from the National Multi-Agency Coordination Group when activated.
2. Receives detailed requests for infrared services and initiates subsequent dispatch of infrared-equipped aircraft.

### **2.3.2 National Interagency Incident Communications Division/Branch of Infrared**

1. Provides funding for the infrared thermal line scanning equipment and qualified support personnel.
2. Provides an Infrared Technician for flying infrared missions in FS-operated aircraft.
3. Provides the Infrared Technician schedule to the Supervisory Pilot for crew coordination and posting on this Web site: <http://fswweb.r4.fs.fed.us/unit/faa/aviation.htm>

### **2.3.3 Intermountain Region Aviation Group**

1. Provides and maintains aircraft for infrared line scanning equipment.
2. Provides pilot staffing for infrared missions in FS-owned or leased aircraft.
3. Provides pilot oversight and training, and assures current certification for pilots.
4. Provides for the maintenance, scheduling, and availability of FS-owned or leased aircraft in the infrared program.



### **2.3.4 Remote Sensing Applications Center**

1. Provides remote sensing support and guidance to NIFC and to the NIROPS program.
2. Provides infrared interpretation training and support as requested.
3. Acts as a liaison to NASA Ames Research Center, academia, and the commercial vendor community.
4. Updates the Infrared Field User's Guide and Vendor Listing as needed.

## **2.4 ORGANIZATION**

### **2.4.1 Titles and Duties**

A list of positions with a description of duties is provided for clarification.

#### **2.4.1a National Multi-Agency Coordinating Group, NICC**

The National Multi-agency Coordinating (NMAC) group of the NIFC provides interagency coordination at top management levels and allocates multi-agency emergency resources for any incident. This group provides:

1. Overall situation status information.
2. Incident priority determination.
3. Resource acquisition or allocation.
4. Political interfaces.
5. Information to the media and the agencies involved.

#### **2.4.1b Coordinator on Duty, NICC**

The Coordinator on Duty (COD) is responsible for shift planning, coordination, management and supervision of the four functional areas at NICC: aircraft, overhead, equipment, and crews. The coordinator will:

1. Review Resource Orders, Daily Situation Reports, and Incident Summaries.

2. Ensure that information is shared, plans are developed, and decisions (course of action) are implemented by and within the four functional areas.
3. Monitor Resource Orders and resource status.
4. Prioritize resource orders during periods of elevated fire activity if competition for resources exists and when the NMAC group is not activated.
5. Provide coordination and maintain communications with the Geographic Area Coordination Centers (GACCs).
6. Provide record keeping and shift supervision.
7. Notify agency managers of resource commitments and capabilities.

#### **2.4.1c      Aircraft Desk, NICC**

1. Receive, log, track, and assign NIROPS aircraft to field units to assist in the detection and mapping of wild land fires.
2. Receive and log resource orders for infrared missions.
3. Notify the NICC COD/IRCN of all new infrared resource orders.
4. Process IR Resource Orders according to the coordinator's assignment.
5. Pass the assigned resource information to the requesting office, including the flight's actual time of departure and estimated time of arrival. Confirm arrival of aircraft.
6. Update the status of the aircraft order in the Resource Ordering and Status System after each night's mission as to whether the order was filled or unfilled.

#### **2.4.1d      Infrared Coordinator National, NICC**

The Infrared Coordinator National (IRCN) position is activated by and assigned to NICC. The activation of this position is normally triggered at PL-4 (refer to the National Mobilization Guide, 26.3.4). The main duties of this position are the coordination of government and contract infrared aircraft.

The IRCN will:

1. Receive IR Aircraft Scanner Requests.
2. Obtain weather briefings and incorporate weather information into shift planning. If the weather is questionable and time permits, the IRCN will contact personnel at the incident directly for spot weather information and relay this information to the aircrews.

3. Establish resource needs, including personnel and equipment.
4. Consult with the NICC Coordinator on Duty and order GACC(s) to establish priorities and relay this information to the aircrews.
5. Submit preliminary IR flight plan to the NICC Coordinator on duty for approval and quality control.
6. Develop flight schedule using the IR Aircraft Scanner Requests and based on aircraft capability, availability, and location. Under planning levels 4 and 5, the IRCN provides guidance on incident priority.
7. Coordinate mission planning with NICC COD and Pilot(s) in Command (PIC).
8. Receive proposed mission plan from IR Coordinator Regional (if in place) and/or PIC. This plan is reviewed, approved and submitted to the aircraft dispatcher by the NICC Coordinator on Duty.
9. In conjunction with the flight crews, write the NIROPS Daily Status Report (for each aircraft including contract aircraft) and submit it to NICC, the FS Operations Director, and all involved GACCs at the end of each duty day. Also provide electronic copies of the report to the flight crewmembers.

The NIROPS Daily Status Report will include:

- Accomplishments of each infrared aircraft.
  - Status and availability of aircraft.
  - Infrared Scanner Orders received, planned, filled, and unable to fill (UTF). The reason for UTF orders are explained in this document.
  - Any problems encountered by infrared operations, such as weather.
  - Geographic location of each aircraft.
  - Brief summary of observed fire activity.
  - Daily After Action Review (AAR).
10. Coordinate with Supervisory Pilot on aircraft maintenance schedule and needs.
  11. Coordinate crew rotation with the Supervisory Pilot and the IR Technician Supervisor.
  12. Monitor and assist in the well being of the flight crew on such items as lodging, rental car, and transportation of equipment and personnel as needed.

13. Conduct an AAR conference call, when necessary, with Regional IR Coordinators, Supervisory Pilot (or designee), and Infrared Interpreters (IRIN) to review what happened, why it happened, highlight successes, and plan for the correction of problems.

Note: The IRCN is expected to be knowledgeable and informed about IR interpreters, air operations, dispatch procedures, FAA flight regulations, aircraft flight limitations, IR equipment power requirements, and basic navigational systems and procedures.

#### **2.4.1e      Infrared Coordinator Regional, GACC**

The Infrared Coordinator Regional (IRCR) is ordered by a GACC when needed. The IRCR reports to the Intelligence Coordinator at the GACC. The position provides infrared coordination and assistance between the resource (aircraft and crew) and the ordering agency when operational control of an infrared aircraft is assigned to a specific GACC. The coordinator will:

1. Keep the IRCN informed of all infrared activities. (This information is required for the NICC Daily Report). Information includes aircraft and aircrew status, flight time, mission accomplishments, problem areas, and location of crews.
2. Receive Infrared Aircraft Scanner Requests from the Incident Management Team (IMT), Forest or cooperating agencies.
3. Establish contact with NICC, and file daily reports on infrared status and accomplishment.
4. Establish direct communication with Infrared Interpreters.
5. In coordination with local area command, order flights through IRCN or NICC. Depending upon the situation, NICC may turn over coordination to the local GACC.
6. Coordinate with PIC on mission planning.
7. Provide liaison between aircrew and incident. Ensure that imagery processing and delivery times are understood.
8. Notify NICC COD by phone of adjustments in the schedule and/or actual flight times.
9. Provide Infrared Interpreter demobilization instructions when a pod is assigned (see sec. 2.4.1h below for definition of a pod).

#### **2.4.1f      Pilot in Command**

The Pilot in Command (PIC) is the point of contact and coordinates IR assignments with NICC when aircraft are operating in separate locations and there is no IRCN or IRCR in place. Under

this scenario, the duties of the PIC are:

1. Receive Aircraft Resource Order and IR Aircraft Scanner Request from NICC dispatch. Participate in mission planning.
2. Notify flight crew of dispatch assignment and requirements.
3. Notify NICC dispatch of departure schedule and flight plan. Update the Scanner Order Request website.

Under any scenario, the aircraft Pilot in Command will be in charge of the infrared mapping flight crew. These responsibilities include:

1. Assume team leadership for flight crew (co-pilot and IR Technician).
2. Assure that the pre-mission briefing is accomplished with the flight crew.
3. Assure that the mission is accomplished in a safe and efficient manner.
4. Assure that the flight follows and is in accordance with Federal Aviation Administration (FAA) requirements.
5. Coordinate with IRCN and/or IRCR on mission planning.
6. Complete flight planning for the mission.
7. Report the flight time for the aircraft to the Intermountain Region Maintenance Program Manager.
8. In conjunction with the IRCN, IRCR, and/or pod leader, complete the Infrared Aircraft Daily Status Report for the NICC Coordinator, the FS Operations Director, and the pertinent GACCs. The report will state: flight crew duty schedule; number and name of incidents flown; hours flown during this day; aircraft time remaining until next scheduled maintenance; scanner maintenance needs; any changes in plans; and the crew and aircraft location and telephone numbers. A copy will be provided to each aircraft PIC at the end of the day.
9. Conduct an AAR for each mission requiring such review. Report AAR results to Supervisory Pilot, IRCN, IRCR, or COD (or FS Washington Office, Fire Operations).

#### **2.4.1g Infrared Technician, NIFC**

The duties of the NIFC IR Technician include:

1. Maintain, install, and operate the FS-owned thermal infrared systems. An Infrared Pilot will make an entry in the 5700 aircraft log during installation or removal of infrared systems, referencing the scanner installation work order.

2. Serve as an aircraft crewmember. Can be assigned duties by PIC to assure safe operation of the aircraft. This can include securing the cabin and giving safety briefings to passengers.
3. Recommend the required speed and altitude above the incident for the mission, with coordination and approval of the Pilot in Command (safety-related).
4. Responsible for the safe installation, removal, and inspection of the infrared line scanner systems in FS aircraft, in coordination with an infrared pilot and a maintenance inspector.
5. In conjunction with the PIC and IRCN, assure liaison link is established with benefiting agency/incident (the customer receiving the IR data).
6. In conjunction with the PIC and IRCN, aid in completion of the Infrared Aircraft Daily Status Report, when requested, for the NICC Coordinator on Duty, the FS Operations Director, and the pertinent GACCs.

#### **2.4.1h Situation Unit Leader, Incident**

The Situation Unit Leader (SITL) is responsible for the collection and organization of incident status and situation information, and the evaluation, analysis and display of that information. The SITL will:

1. Assign duties to Situation Unit personnel including Infrared Interpreter (see 2.4.1h for variance from this direction).
2. Obtain the Aircraft Resource Order number (A#) for the next night's flight or instruct the IR Interpreter to obtain the A# from dispatch.
3. Obtain and analyze infrared data from the IRIN and/or the Geographic Information System Specialist (as applicable).

#### **2.4.1i Infrared Interpreter (IRIN), Incident**

An IRIN works for the SITL. The IRIN directs infrared mapping operations on an incident or complex and coordinates infrared mapping with the SITL.

An IRIN can work under three different scenarios:

- An individual working with an IMT.
- A member of a "pod" of IRINs at a centralized location.
- An individual working remotely from his or her home office.

Regardless of where the IRIN works, his/her primary objectives are:

- Maintain quality control.

- Determine heat perimeter.
- Identify isolated heat sources.
- Calculate acreage of the perimeter.
- Produce summary maps.

The IRIN will:

1. Obtain a briefing from the SITL.
2. Interpret imagery, determine heat perimeters, identify isolated heat sources, and post findings on maps.
3. Determine the acreage of the incident for each interpretation.
4. Maintain quality control and produce summary maps.
5. Determine availability of infrared equipment and where it is based.
6. Maintain direct communications with IRCR or IRCN, and/or the flight crew.
7. Arrange for missions with the SITL.
8. Develop and submit Infrared Scanner Request that establishes objectives of flight, flight timing, areas of concern, and imagery delivery schedule. Note geographic features that need to be marked by the IR Technician for the purpose of orientation.
9. Maintain IR Interpreter Log including feedback and critique items.
10. Maintain IR Interpreter Kit when ordered/assigned (National Fire Equipment System 4800, IR Downlink Kit)
11. Deliver all interpreted data, maps, and logs to the SITL or incident in a timely manner according to agreed-upon procedures.

## **Pods**

A pod is defined as more than one IRIN at a location central to multiple incidents. A pod of IRINs is used to provide support in the most efficient manner. The IRCN, NICC, and the corresponding GACC determine when a pod is to be established. Since IRINs in a pod work multiple fires, it is recommended that a single charge code be established for a pod.

## **Pod Leader**

The IRCN will appoint a pod leader from the pool of activated IRINs once it has been determined that a pod is required. The pod leader is the point of contact unless an IRCR is activated. If an IRCR is activated, the pod leader will report directly to the IRCR. If there is no IRCR designated, the pod Leader reports to the IRCN.

Pod leader duties include:

1. Advise IRCN on IRIN personnel issues including staffing levels, length of assignments, and IRIN performance.
2. Serve as the secondary contact with IMTs and help resolve issues between pod IRINs and the IMTs.
3. Sign timesheets if directed by local financial management team.
4. Assign IRINs to incidents to ensure optimal customer service and staffing levels.
5. Ensure all products are delivered in a timely manner and all flight requests are submitted.
6. Track Interpreter Kits NFES #4800 when ordered.
7. Brief MAC group SITL, if one is assigned.
8. Collect and communicate IMT priorities to MAC group, GACC, IRCR, and IRCN.

### **Remote IRIN**

The IRCN can assign an IRIN to complete IRIN assignments from a remote location, usually his/her home office or personal residence. The IRCN will, with the assistance of the IRCRs, maintain a list of IRINs qualified to do remote work. Remote interpretation will be used for short (one-to-three day) assignments, or until an IRIN can be assigned and located at the incident or for assignments that are intermittent in schedule such as every third day of a remote fire under containment strategy. The qualifications for a remote IRIN are as follows:

1. Qualified infrared interpreter
2. A good knowledge of:
  - ArcMap
  - FTP and electronic communications
  - Permissions and file management
3. Access to agency network (high-speed connection)
  - Building access such as a key card, key, or other after-hours entry to a Forest Service office
  - A Forest Service laptop with a Virtual Private Network (VPN) client installed and a VPN account
4. Approved by supervisor for remote IRIN work
5. Able to operate autonomously; flexible; adaptable
6. Good communication skills

### **2.4.1j Supervisory Pilot**

NOTE: The following sections refer to sections of the Forest Service Manual (FSM) 5709.16, which is the Flight Operations Handbook (FSH).



The duties of the supervisory pilot include:

1. Manage the Intermountain Region infrared pilot staff.
2. Establish the pilot schedule and duty-day hours for the infrared pilot staff.
3. Coordinate with the Intermountain Region Aviation Maintenance Program Manager for maintenance of FS-owned aircraft.
4. Train and determine qualification of infrared pilots (FSH, sec. 20.45 and 28.04).
5. Provide mission checks for the infrared pilots and approve assignment of supplemental pilots (refer to FSH, section 28).
6. Serve as an advisor to the Intermountain Region Fire, Aviation and Air Management staff on infrared issues.
7. Coordinate with the Infrared Technician of the NIFC for the installation, maintenance and support of scanner equipment.
8. Coordinate with the Infrared Technicians Supervisor regarding aircraft staffing and post schedule to <http://fsweb.r4.fs.fed.us/unit/faa/aviation.htm>
9. Coordinate with the IR Coordinator National (or Washington Office, Fire Operations) on aircraft, pilot, and maintenance schedules.
10. Approve all passengers other than flight crew on NIROPS aircraft. The flight crew consists of a Pilot in Command, co-pilot and IR technician.

#### **2.4.1k National IR Program Manager**

This position performs various duties throughout the year and will remain under the direction of NFIC-FS. Job tasks include, but are not limited to:

1. Conduct the S443 Infrared Interpreter class.
2. Assign GACC IR Liaisons.
3. Coordinate with WO, IR Technicians, and R4 Pilots on status of aircraft and equipment.
4. Serve as primary contact with RSAC and NASA.
5. Inform NIFC of budget needs for travel and training.
6. Be consulted and updated on new IR systems, testing and aircraft considerations.

#### **2.4.11 Geographic Area IR Liaison, GACC**

The GACC IR Liaison year-round duties include, but are not limited to:

1. Be the primary IR contact for the Interagency Center Manager, Geographic Area Training Representative, and dispatch offices in their GACC.
2. Maintain an up-to-date list of qualified and available IRINs and trainees.
3. Provide usernames and passwords for access to the IR scanner order web site.
4. Provide briefings and/or information to users of NIROPS services.

## CHAPTER 3 - MOBILIZATION

### 3.1 INTRODUCTION

The Forest Service infrared aircraft, the Super King Air B200 and the Citation Bravo, are maintained in dispatch-ready status from mid-April through mid- November (exact dates are worked out pre-season between FS Washington Office, Fire Operations and R4 IR Supervisory Pilot). Services can be provided at other times of the year but advanced planning is required. Around June 1 of each season, the infrared pilot staff schedule changes to a late start time (1200 – 1500 depending on activity and at the discretion of the IR Supervisory Pilot). This tour remains in effect until the demand for IR decreases in the fall.

For a single flight or mission, the aircraft remains a national resource and is coordinated through NICC for IR operations. The aircraft can be assigned as a GACC resource during a major fire or high preparedness level.

When there is competition for IR resources from diverse geographical areas, coordination of the IR aircraft is done at the national level (FS Washington Office, Fire Operations or NMAC).

### 3.2 ORDERING PROCEDURE

The initial mobilization order is placed from the incident to the local dispatch, to the respective GACC, and then to the NICC aircraft desk. The NICC Coordinator on Duty has the authority to mobilize FS infrared line scanning-equipped aircraft.

1. Orders are placed by the SITL, or by dispatch or the IRIN under the direction of the Situation Unit Leader, using the NIROPS website: <http://nirops.fs.fed.us/rcr/newscanner/>. User names and passwords will be assigned to incident personnel on an as-needed basis; these can be obtained by calling the Infrared Coordinator Regional, RSAC, or the Infrared Coordinator National.
2. If the website is down, or the incident does not have Internet connectivity, orders may be placed manually by filling out an IR Aircraft Scanner Order form and faxing it to Expanded Dispatch or local dispatch. A copy of the form is available online: <http://nirops.fs.fed.us/>.
3. Each request for an IR flight will have an Aircraft Resource Order number (A#) assigned by the local dispatch.
4. All subsequent requests for IR flights will have unique request numbers. (For example, if an incident ordered flights on three different days, there would be three different "A" request numbers.)
5. The Infrared Aircraft Scanner Request **must** be completed for each IR order **every day**. Changing the date and re-submitting the order from the previous day is unacceptable.

Updates to fire size, behavior, mission, personnel, and a new A# are reflected in the new order. There are no “standing” orders.

6. NICC will notify the IR Supervisory Pilot or designee and PIC regarding requested scanner aircraft (refer to sec. 2.4.1e) by 1530 MDT.
7. A copy of the IR Resource Order and the IR Aircraft Scanner Request will be provided to the aircrew.
8. NICC, the ordering GACC, or the IRCN will confirm a qualified IRIN is available at the time of the infrared flight (refer to the National Mobilization Guide sec. 24.4).

**During periods of high fire activity and competition for resources, an IRCN will be assigned at NICC and will have coordination responsibilities for NIROPS aircraft.**

1. IR orders should be placed with NICC by 1530 MDT to ensure that orders are prioritized and a preliminary mission plan is developed for the aircrews by 1630 MDT.
2. NICC will accept all orders for IR services.
3. Orders will be filled based on national priorities established by the NMAC group.
4. The order will be given to the IRCN who will notify the appropriate PIC.
5. The IRCN will notify NICC of flight schedules and imagery delivery times.
6. The IRCN will ensure a qualified IRIN is available at the time of the infrared flight.
7. The IRCN provides flight crews with a mission priority list that establishes the most critical to least critical ranking of incidents to be flown.
8. NICC notifies the GACC of flight schedules.

Infrared aircraft from sources other than the Forest Service may be ordered through NICC in high-demand situations and/or when existing resources are unavailable. These include such items as contract IR scanner aircraft, forward-looking infrared, infrared cameras, and commercially available thermal imagers.

## CHAPTER 4 - POLICIES

### 4.1 FOREST SERVICE

NOTE: The following sections refer to sections of the Forest Service Manual (FSM) 5709.16 which is the Flight Operations Handbook (FSH).

The Supervisory Pilot is responsible for ensuring the mission readiness of Forest Service aircraft assigned to the infrared operation. He/she may delegate this function, but retains the responsibility and will coordinate all aircraft maintenance with the Intermountain Region Aviation Maintenance Program Manager.

The infrared flight crew will normally consist of:

1. PIC
2. Co-pilot
3. Infrared Technician

#### 4.1.1 Aircraft Maintenance

The Pilot in Command will coordinate with the Intermountain Region Aviation Maintenance Program Manager to ensure that proper maintenance and repairs are performed to keep the aircraft airworthy. The Intermountain Region Aviation Maintenance Program Manager or his delegate will be consulted prior to allowing any maintenance or inspection activities to be performed on the aircraft.

The PIC is responsible for keeping the Supervisory Pilot informed of any actions concerning aircraft maintenance. The infrared aircraft may be removed from service for approximately 20 days each year for scheduled and unscheduled maintenance.

### 4.2 FLIGHT AND DUTY LIMITATIONS

Flight and duty limitations for IR aircraft are specified in FSH, sec. 11.27a, 15.12, and National Mobilization Guide 24.16.

## CHAPTER 5 - AIRCRAFT SAFETY

### 5.1 AIRCRAFT SAFETY

Pilot proficiency, currency requirements and training tools are discussed in Appendix G: Infrared Flight Operations Training Guide.

Standard checklists exist for aircraft operations. These checklists will be used as required by policy or regulation.

All flights will be conducted in accordance with Federal Aviation Administration Regulations and Forest Service policies and procedures contained in Forest Service Manual 5700, Forest Service Handbook and the National Mobilization Guide 5706.

The Intermountain Region Aviation Unit provides IR aircraft for national and international wildfire activity. The training and special procedures for this unit are discussed in Appendix E.

A survival kit is located onboard each aircraft. This kit may have to be expanded to meet regulation requirements when operating in Canada and Alaska.

### 5.2 INFRARED FLIGHT OPERATIONS

The IR mission is normally flown from sunset to early morning hours. The deviation from normal circadian rhythm and the associated risks have been well documented by the military and the Institute of Safety and Systems Management at the University of Southern California. Safety actions taken to minimize these and other risks are listed and discussed below.

#### 5.2.1 Aircraft Crew

For all infrared missions, the FS aircraft require a crew of two pilots, one of which must be a current and qualified government-employed FS pilot (as outlined in Appendix E), and one technician. Crewmembers are limited to 8 hours of flight per duty day for infrared missions.

#### 5.2.2 Aircrew Rotation

The flight and duty limitations for aircraft crewmembers are exhibited in FSH, sec. 11.27a. Every effort should be made to cycle the aircrew members to their duty stations for their days off.

#### 5.2.3 Quality Rest

Quality rest time is a necessity when combating circadian rhythm deviations; all aircrew should be made aware of this. The late-start schedule for fire season is usually established around June 1st. Adjusting the sleep cycle to this schedule can be done by changing normal daytime activities so that sleep begins around midnight. Hotels in a quiet location with isolated rooms are recommended whenever possible so the aircrew members will be able to get uninterrupted rest.

#### 5.2.4 Night Landings

Three night takeoffs and landings are required to be made every ninety days when carrying passengers (FSH, sec. 21.4, item 5). Pursuant to Title 14, Code of Federal Regulations 61.57: no person may act as PIC of an aircraft carrying passengers during the period beginning 1 hour after sunset and ending 1 hour before sunrise, unless that pilot has performed at least 3 takeoffs and 3 landings to a full stop at night within the preceding 90 days.

### **5.2.5 Night Operations**

All aircrew members should pay particular attention to night flying techniques. If the airport publishes instrument approach and departure procedures, those should be used. If possible, particularly at uncontrolled fields, runways with Visual Approach Slope Indicator should be used.

### **5.2.6 Flight Following**

In addition to being flight-followed by the dispatching forest (FSH, sec. 33), GACC or NICC, Instrument Flight Rules (IFR) flight plans should be filed for all missions. On the rare occasion that mission requirements preclude flying under IFR, a Visual Flight Rules (VFR) flight plan will be substituted.

## **5.3 GROUND OPERATIONS**

### **5.3.1 Aircraft Storage**

The Intermountain Region Aviation Group has an aircraft hanger located at the Ogden, Utah airport. The FS-owned infrared aircraft are based at this site and receive the majority of their maintenance at this facility.

The Washington Office in Boise, Idaho has an aircraft hanger located on the NIFC ramp complex. The FS infrared aircraft use this facility when operating out of Boise or when scanner equipment is being serviced.

During fire season the infrared aircraft spend a great deal of time away from their main base of operation. There are many things for the aircrew to consider when choosing a facility for a temporary base. These include:

1. Security of the airport and Fixed Base Operator (FBO);
2. Maintenance availability at the airport and/or FBO;
3. Hanger availability for the aircraft (especially if weather is threatening);
4. 24-hour service at the FBO to ensure that fuel is available and the aircraft is accessible at the late night hours during which infrared missions are flown.

### **5.3.2 Ground Power Unit**

When using a ground power unit (GPU) for starting the aircraft, a thorough briefing will be given to the GPU personnel for safety and protection of the aircraft from circuit overloads. This should include:

1. Complete start procedures;
2. Disconnect procedures;
3. Necessary hand signals;
4. Adequate hearing protection.

### **5.3.3 Fueling**

The fueling of the aircraft is the responsibility of the PIC. The PIC will:

1. Ensure that correct quantity and type of fuel is used.
2. Ensure that a designated crewmember is present during fueling operations.

## **5.4 HAZARDOUS MATERIALS**

The two aircraft committed to the IR program use liquid nitrogen to cool the infrared thermal detectors. The King Air and Citation aircraft carry the liquid nitrogen inside the aircraft cabin. The liquid nitrogen is carried in accordance with Compressed Gases and Liquids, Interagency Aviation Transport of Hazardous Materials, Ch. 6, January, 2005 (NFES #1068). Additional information may be found in the online publication: <http://amd.nbc.gof/safety/library/hazmathb0105.pdf>.

## **5.5 ACCIDENT/INCIDENT REPORTS**

### **References:**

**Forest Service Manual 5720.46, item 3.**

**FSM 5720.5 – Definitions, Aircraft Incident**

**FSM 5723 - Aviation Accidents And Incidents Investigations, Reports, And Procedures**

**FSM 5723.1 - Investigation Guide and Accountability for Aircraft Accidents**

**FSM 5723.2 - Monitoring and Reporting Accidents and Incidents Procedures**

**FSM 5723.21 - Reporting Accidents and Incidents with Potential**

**FSM 5723.22 - Accidents and Incidents Requiring Immediate Notification to National Transportation Safety Board**

## **5.6 OVERDUE AIRCRAFT**

**FSM 5723.22, item 3.**



## APPENDIX A NIROPS FORMS

### **A.1 Infrared Aircraft Scanner Order Form**

The hardcopy order form is to be used ONLY in the event that the online NIROPS Ordering System is offline. This form can be found on the NIROPS web site at <http://nirops.fs.fed.us/rcr/newScanner/>. User names and passwords will be assigned to incident personnel on an as-needed basis. These can be obtained by calling the Infrared Coordinator Regional, RSAC, or the Infrared Coordinator National. In the event that the web site is down, manually filling out the attached form with ALL information and then faxing it to Expanded Dispatch or a local dispatch office is acceptable. Information should be entered into the online system as soon as possible for tracking and accounting purposes.

## INFRARED AIRCRAFT SCANNER ORDER

**Incident/Project#:** \_\_\_\_\_ **Override#:** \_\_\_\_\_ **A-** \_\_\_\_\_

Incident Name:		Date/Time:	
Ordering Unit:		Telephone #:	(     )
Local Dispatch:		Telephone #:	(     )
GACC:		Telephone #:	(     )
National IR Coord:		Telephone #:	(208) 387-5400
		FAX #	(208) 387-5414
		Cell #	(208) 859-4475
Regional IR Coord:		Telephone #:	(     )
		FAX #:	(     )
		Cell #	(     )
IR Interpreter Ordered:	<input type="checkbox"/> YES	<input type="checkbox"/> NO	Telephone # (     )
IR Interpreter Assigned:			Cell # (     )
Location: Motel			Motel # (     )
Office or ICP			FAX # (     )
SITL Name and Location:		Telephone #:	(     )
Incident Elevation (AVG):	Feet MSL	Approximate Size:	Acres
Weather Over The Incident:			
Delivery Point:			Alt. Delivery Pt:
Delivery type:	<input type="checkbox"/> Land Aircraft		<input type="checkbox"/> Scanned File (give email address or ftp site in box below)
Delivery time:	Frequency for Airdrop:		Mhz /Tone:
Delivery point weather:			

### Radio Frequencies

Dispatch	Tx:	Mhz	Tone:	Rx:	Mhz	Tone:
Alternative Freq	Tx:	Mhz	Tone:	Rx:	Mhz	Tone:
Air-To-Ground	Tx:	Mhz	Tone:	Rx:	Mhz	Tone:

### Mission Objective and Description:

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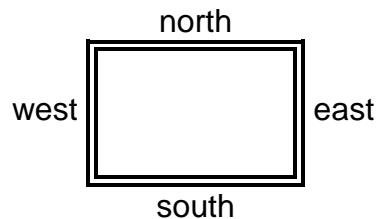


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### LATITUDE/LONGITUDE INFORMATION NEEDED FOR EACH MISSION

#### Mapping Block

NORTH	0	‘
SOUTH	0	‘
EAST	0	‘
WEST	0	‘



## **A.2 Aircraft Daily Status Report**

This form provides multiple recipients (i.e., NICC, Region 4 – Intermountain Aviation, etc.) with the daily accomplishments, hours flown, and missions completed or dropped. The information contained in this form is important for tracking hours until maintenance, number of missions completed, and the information needed to brief personnel on the night's accomplishments.

This form is usually filled out by one of the aircrew members at the completion of a night's last mission. During times of high fire activity, and when the IRCN's office is in operation, this form will be filled out by the IRCN and emailed and/or faxed to pertinent personnel.

<b>AIRCRAFT TAIL NUMBER</b>	<b>149Z</b>					
<b>IR FIELD SPECIALIST REPORTING:</b>						
<b>FLIGHT DATES:</b>						
<b>TIME OF THIS REPORT:</b>						
<b>1. AIRCRAFT SCHEDULE:</b>						
<b>2. Number of Incidents Scheduled:</b>						
<b>3. Fires Planned to Fly by GACC:</b>	<b>AK</b>	<b>EA</b>	<b>EB</b>	<b>NO</b>	<b>NR</b>	<b>NW</b>
	<b>RM</b>	<b>SA</b>	<b>SO</b>	<b>SW X</b>	<b>WB</b>	<b>INT</b>
<b>4. UTF fires by GACC:</b>						
	<b>AK</b>	<b>EA</b>	<b>EB</b>	<b>NO</b>	<b>NR</b>	<b>NW</b>
	<b>RM</b>	<b>SA</b>	<b>SO</b>	<b>SW</b>	<b>WB</b>	<b>INT</b>
<b>5. FIRES SCHEDULED: (Line out UTFs)</b>						
<b>6. HOURS FLOWN DURING THIS SHIFT:</b>						
<b>7. Hobbes Meter at flight's end:</b>						
<b>8. AIRCRAFT MAINTENANCE:</b>						
<b>9. HOURS TO INSPECTION:</b>						
<b>10. SCANNER MAINTENANCE:</b>						
<b>11. ANY CHANGE IN PLANS?:</b>						
<b>12. FLIGHT CREW LOCATION, HOTEL PHONE AND ROOM NUMBERS:</b>						
<b>13. OTHER FLIGHT CREW PHONE NUMBERS (i.e., FBO AND FAX):</b>						
<b>14. NEWS ITEMS, SIGNIFICANT EVENTS:</b>						
Please forward this information to Phone: 1-800-994-6312 or 208-387-5400 or Fax: 208-387-5414						

## **APPENDIX B DELIVERY METHODS FOR INFRARED IMAGERY**

### **B.1 Direct Handoff**

The direct handoff method of delivering imagery is to “burn” the mission images and information to a CD or USB drive and physically hand the data to an IRIN. This allows the IR Technician to brief the IRIN on observed fire behavior, collection methods, and any anomalies that were observed while collecting the imagery.

### **B.2 FTP Delivery Method**

Since 2003, NIROPS imagery has been digital. The files created by the Phoenix System are ortho-corrected, GeoTiff format files, along with a GIS-compatible shape file of all detected heat sources. This imagery can be copied to a CD or USB drive for digital delivery via File Transfer Protocol (FTP) methods.

In some situations, the aircraft may land and obtain access to a high-speed internet connection to use the FTP method. The National Wildfire Coordination Group maintains an FTP site specifically for NIROPS imagery. This location can be found at [ftp.nifc.gov](http://ftp.nifc.gov). The login methods, user names, and passwords can be obtained by contacting the NIROPS National Program Manager’s office.

An alternate FTP site has been established at [ftp.nirops.org](http://ftp.nirops.org). The intended use of this site is when the [ftp.nifc.gov](http://ftp.nifc.gov) site is down. The login methods, user name, and password can be obtained by contacting the NIROPS National Program Manager’s office.

### **B.3 Aircell Delivery Method**

The Forest Service has installed high-speed air-to-ground cellular technology from Aircell in both NIROPS aircraft. With this technology, the aircraft no longer needs to be on the ground to perform FTP delivery. Delivery can be performed while transiting between incidents which improves the speed and efficiency of data delivery.

The Aircell-delivered data will be posted to the NWCG-maintained FTP sites mentioned above. These sites have been specifically constructed for NIROPS imagery.

Aircell will be notified at the beginning and end of the fire season for system turn on and turn off. This duty is the responsibility of the PIC.

## **APPENDIX C INFRARED FIELD USERS' GUIDE AND COMMERCIAL VENDOR INFORMATION**

Infrared sensors have been aiding wildland firefighters for nearly 40 years. Originally only used for initial detection, IR sensors are now used to detect, monitor, and aid in determining fire suppression and mop-up operations. Recent technological developments have resulted in proliferation of IR scanners at fire camps across North America. They range from small handheld units to airborne units that can cover millions of acres per hour with real-time output. Classifying IR scanners into type categories enables incident commanders and situation unit leaders to select the proper equipment for each situation, thus avoiding waste of time and money on imagery that will not be useful. Modeled on the typing scheme used to classify helicopters, this typing scheme is easy to use and simple to understand for firefighting leaders.

Beginning in 2002 the Office of the Director for Wildland Operations at NIFC issued a Request for Information (RFI) to obtain information from all available vendors of fire mapping and detection equipment. The responses were classified by the Remote Sensing Applications Center in Salt Lake City, UT. This vendor information can be obtained by contacting a NICC representative during duty hours. The guide includes an introduction to how infrared sensors work and the differences between the types of systems.

The vendor information is informally updated each spring and goes through the formal RFI process every three years. The latest guide is available on the internet at:

[http://nirops.fs.fed.us/reports/Infrared\\_Field\\_Users\\_Guide\\_and\\_Vendor\\_Listing\\_October\\_2008.pdf](http://nirops.fs.fed.us/reports/Infrared_Field_Users_Guide_and_Vendor_Listing_October_2008.pdf)

## APPENDIX D MISSION PLANNING

### D.1 Deciding Where to Stay Overnight

When deciding where to stay overnight, some considerations are cost-related and can more easily be directly measured and compared; most are operational considerations related to mission accomplishment. The importance of any one item can vary with the changing circumstances of the day (e.g., if a crewmember has a mandatory day off the next day, the importance of recovering at that person's base is increased). It is the responsibility the crewmembers as part of their daily mission planning to evaluate the conditions of the day and make a proper decision about where to stay overnight.

Items to be considered when deciding where to stay overnight include:

- Distance/time to base vs. remain-overnight (RON) location (30 minutes flight time on the aircraft = approximately \$700 for the jet and \$500 for the King Air as of November, 2008)
- Facility at RON location:
  - Approaches available
  - Maintenance required/desired on aircraft
  - Airport security at RON location
  - Hanger facility (to provide protection from weather)
  - 24-hour fuel available
- Crew accommodations
- Ground transportation
- Number of crewmembers who would be remaining overnight (estimated average per diem cost is \$250 per crewmember)
- Airline cost of crew changes
- Time remaining before next aircraft inspection
- Weather
- Airspace/Air Traffic Control (The type of airspace or ATC service could cause delays or, at some places, make operations more expedient.)
- Centralized recovery location (could reduce crew fatigue level)
- Quality/speed of internet service at RON location
- Availability of an interpreter or other person to upload IR imagery
- Time needed at the end of the mission for IR technician to upload imagery

## **D.2 Standard Operating Procedures Checklist**

### **Flight planning**

- Obtain all pertinent information necessary to conduct mission sortie in a safe, cost-effective manner. This includes the following:
  - Preflight action: weather reports and weather forecasts at departing airports; weather along route of flight; destination airports and alternate airport (if applicable); fuel requirements for flight; airport capabilities including runway lengths, instrument approaches; airport lighting; FBO services, and departure procedures. Complete weight and balance calculations for mission. In the event that multiple missions will be flown with the same payload, original weight and balance will be sufficient.
    - Tables 1 and 2 and chart 1 on the following three pages are intended to act as aids for imaging flight lines over incidents.
      1. Grid Leg Times Table
      2. Ground Coverage Table – Phoenix Systems
      3. Ground Coverage Chart
  - Fuel: while at NIFC, utilize ramp services fuel. If ramp services fuel is not available, contact Western Aircraft (contract fuel).

### **FAA Flight Filing:**

- File either IFR or VFR flight plan with the FAA.

### **Crew Briefing:**

- Conduct crew briefing with pilot, co-pilot, and infrared technician. Discuss fires to be flown, route, weather considerations, length of flight, duty day, and imagery drop off procedures (hand deliver, upload to FTP site, or Aircell downlink).

### **Notification Procedures:**

- Contact NICC aircraft desk (flight following). If an IRCN is being used, contact him/her as necessary.

### **Lodging/Transportation at Destination:**

- Ensure that adequate lodging accommodations and a rental car are available at the destination.

### **Aircraft Fuel at Destination:**

- Ensure aircraft fuel is available at either intermediate stop or final destination.



**Table D.1: Grid Leg Times**

<b>MILEAGE</b>	<b>GROUND SPEED</b>	<b>LEG TIMES (*)</b>
5 NM	220 KTS	1:30
10 NM	220 KTS	3:00
15 NM	220 KTS	4:30
20 NM	220 KTS	6:00
25 NM	220 KTS	7:30
30 NM	220 KTS	9:00
35 NM	220 KTS	10:30
40 NM	220 KTS	12:00
45 NM	220 KTS	13:30
50 NM	220 KTS	15:00
55 NM	220 KTS	16:30
60 NM	220 KTS	18:00

<b>MILEAGE</b>	<b>GROUND SPEED</b>	<b>LEG TIMES (*)</b>
5 NM	250 KTS	1:20
10 NM	250 KTS	2:40
15 NM	250 KTS	4:00
20 NM	250 KTS	5:20
25 NM	250 KTS	6:40
30 NM	250 KTS	8:00
35 NM	250 KTS	9:20
40 NM	250 KTS	10:40
45 NM	250 KTS	12:00
50 NM	250 KTS	13:20
55 NM	250 KTS	14:40
60 NM	250 KTS	16:00

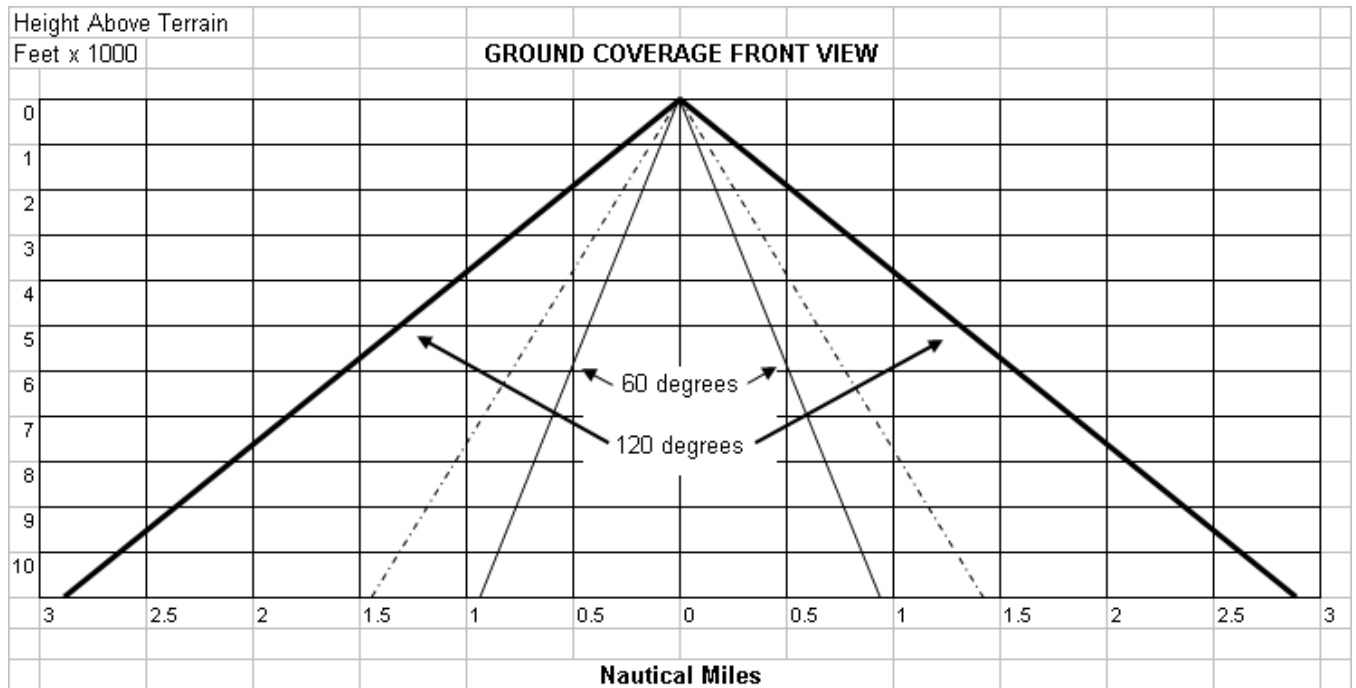
<b>MILEAGE</b>	<b>GROUND SPEED</b>	<b>LEG TIMES (*)</b>
5 NM	280 KTS	1:10
10 NM	280 KTS	2:20
15 NM	280 KTS	3:30
20 NM	280 KTS	4:40
25 NM	280 KTS	5:50
30 NM	280 KTS	7:00
35 NM	280 KTS	8:10
40 NM	280 KTS	9:20
45 NM	280 KTS	10:30
50 NM	280 KTS	11:40
55 NM	280 KTS	12:50
60 NM	280 KTS	13:00

\* Note: Leg times DO NOT include time required for turns on mapping tracks.

**Table D.2: Ground Coverage Table – Phoenix Systems**

ALTITUDE ABOVE GROUND LEVEL (AGL)	COMPLETE GROUND COVERAGE (EDGE TO EDGE) NAUTICAL MILES	COMPLETE GROUND COVERAGE (EDGE TO EDGE) STATUTE MILES	OFFSET FOR 25% OVERLAP NAUTICAL MILES	OFFSET FOR 25% OVERLAP STATUTE MILES
<b>3000</b>	1.70	1.97	1.36	1.56
<b>3500</b>	1.99	2.29	1.59	1.83
<b>4000</b>	2.28	2.62	1.82	2.09
<b>4500</b>	2.56	2.94	2.04	2.35
<b>5000</b>	2.85	3.28	2.28	2.62
<b>5500</b>	3.13	3.60	2.50	2.87
<b>6000</b>	3.41	3.93	2.73	3.14
<b>6500</b>	3.70	4.26	2.96	3.40
<b>7000</b>	3.99	4.59	3.19	3.69
<b>7500</b>	4.27	4.91	3.42	3.93
<b>8000</b>	4.56	5.24	3.65	4.20
<b>8500</b>	4.84	5.57	3.87	4.45
<b>9000</b>	5.13	5.90	4.10	4.72
<b>9500</b>	5.41	6.22	4.33	4.98
<b>10,000</b>	5.70	6.55	4.56	5.24
<b>10,500</b>	5.98	6.88	4.78	5.50
<b>11,000</b>	6.27	7.21	5.02	5.77
<b>11,500</b>	6.55	7.53	5.24	6.03
<b>12,000</b>	6.84	7.86	5.47	6.29
<b>12,500</b>	7.12	8.19	5.70	6.55
<b>13,000</b>	7.40	8.52	5.92	6.80
<b>13,500</b>	7.69	8.85	6.15	7.07
<b>14,000</b>	7.98	9.17	6.38	7.34

**Chart D.1: Ground Coverage Chart**



**Note: Dashed line is 87 degrees.**

## **APPENDIX E INFRARED PILOT TRAINING GUIDE**

### **E.1-- INTRODUCTION**

#### **E.1.1 OBJECTIVES**

This guide has been prepared to establish standards for pilot training and qualification in the infrared mission. All pilots operating Forest Service aircraft must meet the standards laid out in this training guide as well as those standards set forth in the FSM 5709.16, Flight Operations Handbook (referred to herein as Forest Service Handbook, FSH).

Specific objectives are:

- a. To set forth completion and evaluation standards for pilots to become mission qualified.
- b. To establish the requirements for mission currency for those pilots who are already mission qualified.

#### **E.1.2 SCOPE**

The infrared support mission is accomplished with Forest Service operated aircraft as well as contracted aircraft. The standards and procedures contained in this guide apply to government infrared operations only. Contracted infrared services will be addressed in the contract. This guide concerns mission training only; general flight training is addressed in the Forest Service Manual 5709.16 -- Flight Operations Handbook.

#### **E.1.3 Authority for Aircraft Operations**

Infrared operations are conducted under the authority of Forest Service Manual 5700 and Forest Service Manual 5709.16, Flight Operations Handbook (referred to herein as Forest Service Handbook, FSH).

#### **E.1.4 Reviews and Revisions**

(Reserved)

## **E.2 – PILOT QUALIFICATIONS AND CURRENCY**

### **E.2.1 QUALIFICATIONS**

Pilot in Command -- Minimum qualifications and experience for Forest Service pilots in the infrared program are listed in the FSH (experience – Ch. 10 sec. 12.11d; qualifications – Ch. 20 sec. 20.32).

Co-Pilot -- It is the goal for both pilots of each crew to be PIC qualified; this is the optimum crewing for efficiency, safety, and flexibility in scheduling. However, if there is a need to use a non-PIC qualified pilot, the **minimum** requirements for those pilots are set forth in FSH (experience – Ch. 10 sec. 12.11c; qualifications – Ch. 20 sec. 20.32).

### **E.2.2 MISSION QUALIFICATIONS**

The IR Supervisory Pilot is responsible for the training and qualification of infrared pilots (FSH, sec. 28.04) and also provides mission checks for the infrared pilots (FSH, sec. 28.1). IR pilots must:

- Be current in the aircraft to be flown for the mission.
- Complete at least 3 hours mission training in the aircraft (FSH, sec. 21.4).
- Successfully complete the tasks outlined in Chapter 3 of this Appendix and in the IR Pilot Initial Training Syllabus (see Appendix E, sec. 3 of this guide).
- Successfully complete a mission check with the IR Supervisory Pilot.

### **E.2.3 MISSION CURRENCY**

To establish mission currency, the pilot must:

- Be current in the aircraft to be flown for the mission.
- Complete at least 3 hours of mission training in the aircraft annually.
- Successfully complete the tasks outlined in the IR Refresher Training Syllabus.
- Successfully complete a mission check with the IR Supervisory Pilot.

### **E.2.4 GENERAL TRAINING STATEMENT**

Aviation training of crewmembers is intended to ensure that each crewmember is adequately prepared to perform assigned duties safely and proficiently. Training files will be maintained for each flight crewmember. These files will contain all documentation pertaining to crew qualification and training. Aircraft training requirements for basic flight operations are covered in FSH, sec. 20.

Ground training requirements can normally be met through initial or re-training at an approved simulator-based training school. Additional professional training is available through the Interagency Aviation Training (IAT) program's educational seminars, which are available on the Web and through Aviation Conference seminars. Requirements for IR flight crews may be found at [www.iat.gov](http://www.iat.gov) under "position descriptions and required modules."

Equivalent training may be accepted in lieu of courses in the IAT guide when approved by the Regional Aviation Officer.

## **E.3 – MISSION TRAINING**

### **E.3.1 INITIAL MISSION TRAINING**

A pilot begins mission training after completing initial or recurrent training in the aircraft he/she will be flying for the mission. He/she may also enter the mission phase of training after a records check and a proficiency flight evaluation.

The IR Supervisory Pilot is responsible for developing and implementing a mission training program that emphasizes tasks unique to the infrared unit's operational mission. A training syllabus provides a highly structured new-hire upgrade program for infrared captains. The flights in this syllabus are intended as benchmark rides for the trainee; after successful completion of the last syllabus sortie, the trainee will be recommended for a formal mission evaluation. The tasks that need to be successfully completed on the mission evaluation are listed below.

#### **E.3.1.a INFRARED OPERATIONS: GROUND**

The objective of this task is to determine that the applicant:

1. Demonstrates situational awareness of weather, temporary flight restrictions, Notice to Airmen (including airport closures, temporary towers, no fuel, approaches out of service, etc.) for applicant's aircraft.
2. Exhibits knowledge of ramp procedures as they apply to infrared operations.
3. Exhibits knowledge of GPS/FMS (Global Positioning System/ Flight Management System) programming and operation by entering simulated fire coordinates, marking locations, and updating latitudinal and longitudinal readings in the aircraft's GPS/FMS system.
4. Exhibits knowledge of installed FM radios by programming simulated frequencies and tones provided by check airman.

The applicant will:

1. Complete a thorough preflight briefing.
2. Complete the required checklists.
3. Complete all first-flight-of-the-day items per FS requirements.
4. Program the present location and the latitudinal and longitudinal coordinates for the route of fires and the first intended landing site.
5. Program local and useable frequencies into the FM radio.

#### **E.3.1.b INFRARED OPERATIONS: ENROUTE TO FIRE**

The objective of this task is to determine that the applicant:

1. Has knowledge of interagency flight-following procedures (Automated Flight Following/satellite tracking equipment and/or FAA flight following).

2. Has knowledge of proper aircraft configuration, power setting, and flight course to accomplish the flight in a timely fashion.
3. Can perform Crew Resource Management briefing prior to arrival at the fire.

The applicant will:

1. Explain and demonstrate knowledge of interagency flight-following procedures including making phone calls to initialize flight following for the intended flight.
2. Exhibit and demonstrate knowledge of required crewmember briefings, including emergency procedures, power settings, initial departure headings, and planned turns on course.
3. Demonstrate knowledge of the mission by briefing crewmembers about intentions and procedures prior to beginning a scan run.

### **E.3.1.c INFRARED OPERATIONS: ARRIVAL AT FIRE**

The objective of this task is to determine that the applicant:

1. Exhibits knowledge of temporary flight restrictions (Title 14 Code of Federal Regulations 91.137), fire traffic areas, and communication requirements of both.
2. Exhibits the ability to maintain the altitude and geographic location during scanning assignments.
3. Exhibits the ability to position the aircraft such that the IR technician has adequate overlap coverage.
4. Exhibits the ability to use the GPS/FMS system to get corrected coordinates as necessary.
5. Exhibits knowledge of infrared operating speeds/limitations and maintains airspeed as agreed upon with the IR technician prior to a scan run.
6. Exhibits knowledge of infrared operating altitudes and maintains altitude as agreed upon with IR technician prior to scan run.
7. Exhibits the ability to plan an escape route in the event of an engine failure.

The applicant will:

1. Demonstrate awareness of and maintain safe distance from temporary flight-restricted areas as identified in the briefing.
2. Demonstrate situational awareness by referring to terrain, ground and air obstacles during the mission.
3. Demonstrate understanding of necessary overlap of runs by working with the IR technician to maintain the required spacing of latitudinal and longitudinal lines between runs.
4. Demonstrate the ability to program latitudinal and longitudinal coordinates in the GPS system for a new location.
5. Demonstrate understanding of allowable speeds, altitudes, and banking angles in conjunction with the IR technician.
6. Demonstrate understanding of an escape route plan in case of emergency by verbally briefing the crew with updated escape procedures as the situation changes.

Note: The PIC and/or inspector pilot have the discretion to increase reference speeds due to terrain, weather or other factors as long as it is briefed prior to the maneuver and does not exceed aircraft limitations.

### E.3.2 RECURRENT MISSION TRAINING

The Forest Service Handbook, (sec. 20, 21.4, paragraph 8) states that any PIC for a special mission must have 3 hours of actual or simulated mission practice annually incorporating the flight maneuvers, procedures, and techniques associated with each type of mission.

The IR Supervisory Pilot is responsible for developing and implementing the IR pilot refresher course. The current infrared pilot refresher training syllabus is outlined below.

### IR PILOT REFRESHER TRAINING SYLLABUS

<b>GROUND TRAINING</b>	<b>DATE COMPLETED</b>	<b>INSTRUCTOR'S SIGNATURE</b>	<b>PILOT'S INITIALS</b>
Review GPS as pertains to fire mapping			
Review FMS as pertains to fire mapping			
Flight/Mission planning for a multiple fire mission			
Review IR operations manual			

<b>FLIGHT TRAINING RECURRENT</b> (3 HRS. MIN)	<b>DATE COMPLETED</b>	<b>TIME</b>	<b>REMARKS</b>	<b>IP'S SIGNATURE</b>	<b>PILOT'S INITIALS</b>
Actual or simulated fire mapping mission					
Practice during night visual meteorological conditions (VMC)					
<b>INITIAL FLIGHT TRAINING</b>					
25 hours in type of aircraft					
10 hours in specific infrared aircraft to be flown					
10 hours as copilot on infrared missions					
5 infrared missions or 3 actual fire missions as copilot					



## APPENDIX F ABBREVIATIONS

AAR	After Action Review
ATC	Air Traffic Control
CD	Compact Disk
COD	Coordinator on Duty
FAA	Federal Aviation Administration
FAM	Fire and Aviation Management
FBO	Fixed Base Operator
FISC	Fire Imaging Steering Committee
FS	US Department of Agriculture Forest Service
FSH	Forest Service Handbook (Forest Service Manual 5709.16-Flight Operations Handbook)
FSM	Forest Service Manual
FTP	File Transfer Protocol
GACC	Geographic Area Coordination Center
GIS	Geographic Information System
GPS	Global Positioning System
GPU	Ground Power Unit
GPS/FMS	Global Positioning System/Flight Management System
IAT	Interagency Aviation Training
ICP	Incident Command Post
IFR	Instrument Flight Rules
IMT	Incident Management Team
IR	Infrared
IRCN	Infrared Coordinator National
IRCR	Infrared Coordinator Regional
IRIN	Infrared Interpreter
MDT	Mountain Daylight Time
NICC	National Interagency Coordination Center
NIFC	National Interagency Fire Center
NIROPS	National Infrared Operations
NMAC	National Multi-Agency Coordinating
PIC	Pilot in Command
RFI	Request for Information
RON	Remain Over Night
RSAC	Remote Sensing Applications Center
SITL	Situation Unit Leader
UTF	Unable to Fill
VFR	Visual Flight Rules