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Communications Operations Guide, McMurdo Station
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Introduction

The McMurdo Station Communications Operations Group, or Mac Ops, coordinates the radio communications for McMurdo Station and area U.S. Antarctic Program operations.

Mac Ops monitors communications equipment and HF propagation, tracks field and operational-support parties' travel for health and safety purposes, and operates as a critical support mechanism to ensure continuous communications for field parties, vessels, and aircraft.

Scope/Applicability

This guide applies to the Communications Operations work center at McMurdo Station, Antarctica, and constitutes the primary procedural direction for communications operations. This guide also describes the communications-related interaction between McMurdo Station and Amundsen-Scott South Pole Station, hereafter referred to as South Pole Station.

Responsibilities

Note For simplicity, position titles elsewhere in this document are shortened as shown in parentheses below.

Communications Operator ("Operator")

The Communications Operator utilizes radio, satellite, and other communications equipment to support communications needs for USAP participants (including grantees and support personnel) by tracking field party activity, responding to distress calls, and keeping accurate documentation of events.

Station Communications Supervisor ("Supervisor")

The Station Communications Supervisor oversees the operations and personnel of Communications Operations activities at McMurdo Station and assists the Senior Systems Integration Technologist with long term goals and initiatives.

Senior Systems Integration Technologist ("Systems Supervisor")

The Senior Systems Integration Technologist manages policies, procedures and long range planning initiatives for McMurdo Station.

General Overview

The checklists in this section provide Mac Ops personnel with the baseline level of effort necessary to ensure stable, consistent USAP communications support.

Daily Tasking

- Provide general communications support between McMurdo Station, South Pole Station, local and deep field parties, vessels, and other parties as required.

- Operate communications equipment including telephones, radiophones, VHF radio, HF radio, satellite communications, and audio recording equipment.
- Utilize office equipment including computers (e-mail, word processing, spreadsheets), fax machine, copier, and printer.
- Maintain work center documentation, including logs and reports.
- Track fixed-wing and helicopter operations.
- Keep track of weather status (condition 1, 2 or 3) and apply to check-out requirements.
- Provide communications support during Search and Rescue or emergency operations.
- Understand potential emergency scenarios and remain prepared with proper response including notification procedures.
- Respond to Search and Rescue Satellite (SARSAT) beacon alerts.
- Provide proper response to contact from non-government activity or media.
- Provide prompt notification to communications and/or emergency personnel as required for emergencies or unusual situations.
- Monitor daily status of field camp activity including daily check-ins, camp put-ins, pull-outs, and moves.
- Track field parties traveling by vehicle within the McMurdo Station region.
- Relay flight, resupply, logistics, safety, and other information, as needed.
- Monitor HF propagation conditions.
- Provide pre-field communications briefings to field personnel (supervisor).
- Provide an informational passdown briefing to incoming operator at shift change.

Document Management

The operator records the workcenter operations and activity using the following electronic and hard-copy logs.

Each record has a unique purpose and requires the diligence of the operator to maintain the log's integrity.

The following material details the documentation and records-management responsibilities of the Communications Center each day. Some duties may span several shifts, as indicated.

Contingency Plan during Network Maintenance or Outage

Prior to outage

Backup copies of *Mac Log* and *Mac Notes* are saved on the C: drive. These backups are necessary to allow operator to view operational information from the local computer hard disk when network access is unavailable.

1. Open Mac Log.
2. <Save As> C:\Backup Documents\BackupMacLog.xls.
3. Open Mac Notes.
4. <Save As> C:\Backup Documents\BackupMacNotes.doc.

During outage

During the outage, the saved documents above (*BackupMacLog.xls* and *BackupMacNotes.doc*) are available to view. Additional entries to these documents can be made directly on these electronic backup documents or can be recorded in handwritten form.

After Outage

1. Update original (J:drive) *Mac Log* and *Mac Notes.*
   - If updates were recorded in handwritten form, type updates into both documents.
   - If updates were recorded electronically, use <copy> and <paste> functions to transfer new entries from backup documents into original documents.
   - Be sure to resave changes in original (J:drive) documents.
2. Delete *BackupMacLog.xls* and *BackupMacNotes.doc* from C:drive.

McMurdo Regional Travel Log

Sea-ice and regional science parties traveling on foot or via motorized vehicle off established roadways must establish radio contact with Mac Ops before leaving McMurdo Station. The McMurdo Regional Travel Form is a record of each travel party's radio check-out information, return/arrival estimates and revisions, and the completion of the party's travel.

The *McMurdo Regional Travel Log* is a hard-copy document stored at the Mac Ops console.

Record the following information for each party:

- Date
- Event number or department name
- Vehicle number(s)
- Departure location

- Destination location
- Number of Persons On-board (POB)
- Departure time
- Estimated Time of Return (ETR) or Estimated Time of Arrival (ETA)
- Revisions to ETR or ETA
- Actual time of return or arrival
- Radio frequency used for check-out/in
- Driver(s) name(s)
- Name and contact number of Point of Contact (POC)

Note The POC is an individual at McMurdo Station or at the destination (if an established camp) who knows the itinerary/details of the field party's travel. Mac Ops contacts this individual in the event of an overdue check-in.

Daily Aircraft Events

The *Daily Aircraft Events* worksheet is a record of planned aircraft missions and updates that occur throughout the day. The operator disseminates flight schedules and changes in a timely manner to field parties, camps, and stations requesting the information. The night shift operator completes the *Daily Aircraft Events* worksheet upon receiving the flight schedule for the next day.

The operator updates flight status throughout the day as the information is announced, recording the following information in pencil. Any changes to the flight schedule should be marked with a strikethrough (rather than erasure) to retain a history of the changes.

- Aircraft call sign
- Event number of scheduled flights
- Line number of scheduled flights
- Primary mission, including each location
- Alternative missions, if indicated
- Estimated time of departure
- Actual time of departure (record when flight departs)
- Estimated time of arrival (record when flight departs)
- Actual time of arrival (record when flight arrives)
- Mission description (e.g. tanker, reconnaissance, cargo, put-in/pull-out)

- Any change to flight schedules

Note Record cancellations, delays, or mission changes and the reason, if given.

Message/Conference Request Log

The operator receives, relays, and facilitates field-party communications. This may include passing messages and arranging for radio conferences.

The *Message/Conference Form* is a hard-copy log of such requests and is maintained at the operator's console. Record the following information:

- Date and time the request or message was received
- Name of person or group initiating communication
- Name of person or group to receive the information
- Message or information to pass

If a conference request:

- Note the requested date and time
- Note if both parties have confirmed the scheduled conference
- Add initials of the operator making the entry

Mac Log

The *Mac Log* details the telecommunications events and the Mac Ops operator's response and related tasking. It contains the following entries:

- Local Date
- Local time
- Operator's name
- Entry type
- Description of the events, using specific log formats

Note Keep the *Mac Log* open and minimized on the desktop for easy access. You may use the abbreviations of repeaters and camp names when appropriate.

Log Requirements

The operator records the following information in the *Mac Log*:

— Shift change – Record the name of the operators exchanging shifts using each operator's initials. This also includes short shift changes, such as covering for a meal break.

— Regional travel check-out – The following information is transcribed into the *Mac Log* from the handwritten *McMurdo Regional Travel Check-out Form.*

- Vehicle number
- Event number or department name
- Departure location
- Destination location
- Channel or frequency used for check-out call
- Communications quality if anything other than loud and clear
- Number of persons on board (POB)
- Estimated time of return (ETR) or arrival (ETA)
- Revisions to ETR or ETA

— Regional travel check-in (information is required in the following order)

- Actual time of arrival or return (ATA or ATR)
- Operator's initials

— Field camp daily check-in

- Field camp name
- Frequency, channel, or other communications equipment used for check-in
- Communications quality, if other than loud and clear
- Number of POB

— Field camp change (put-in or move)

- Camp name
- Frequency, channel, or other communications equipment used for check-in
- Communications quality, if other than loud and clear
- Number of POB
- Scheduled time for daily check-in, verified during communications

Note Ensure that field party information (daily check-in, put-in, or camp move) is recorded on all Field Party Status documents and/or tracking features, as well as the *Daily Field Camp Report* electronic document. Refer to the Safety and Emergency Procedures section of this guide for more information.

— Vessel check-in

- Vessel name
- Latitude and longitude of reported position

— Weather conditions status

- Note weather condition: 1, 2, or 3
- Location(s), as heard from Mac Weather's announcement over I-Net.

— All notifications to the Search and Rescue Mission Coordinator (SARMC)

— Equipment malfunctions or problems.

- Include description of problem, actions taken and resolution times.

Note Daily log entries for equipment malfunctions should be brief. Details/narrative descriptions are also noted in the *Mac Notes*.

— Unusual or emergency events. (This includes Local Area Network (LAN) or power outages, search-and-rescue drills or events, and disaster-response plan drills or events.)

— Hourly communications status. At the beginning of each hour, record the current communications status, including significant propagation conditions or equipment malfunctions.

Note Use the entry "**All ops normal**" when radio equipment and HF propagation is in working order.

Table 1: Sample 24-hour Mac Ops *Mac Log*

Date	Operator	*Entry Type*	Time	Text	ETA or ETR	ATA or ATR
24-Nov	Romeo	*on*	0000	all ops normal;teac changed; computer restarted		
24-Nov	Romeo	*on*	0100	all ops normal		
24-Nov	Romeo	*on*	0200	all ops normal		
24-Nov	Romeo	*on*	0300	all ops normal		
24-Nov	Romeo	*on*	0400	all ops normal		
24-Nov	Romeo	*on*	0500	all ops normal; radio checks with SP		
24-Nov	Juliet	*on*	0600	all ops normal; Juliet on for Romeo		
24-Nov	Juliet	*dc*	0624	BI dci, 4 souls, phone		
24-Nov	Juliet	*dc*	0635	MP dci, 3 souls, phone		
24-Nov	Juliet	*dc*	0658	LH dci, 11 souls, phone		
24-Nov	Juliet	*on*	0700	all ops normal		
24-Nov	Juliet	*rt*	0707	Delta 092/Flt Ops, McM to 13 mile camp (off Pegasus), 3 souls, MO, etr 1300	1300	0723jc
24-Nov	Juliet	*rt*	0724	904/Flt Ops, McM to 13 Mile Camp, 2 souls, MO, etr 1300	1300	1203jc
24-Nov	Juliet	*dc*	0725	I-133 dci, 4 souls, FP1		
24-Nov	Juliet	*dc*	0729	LF dci, 4 souls, phone		
24-Nov	Juliet	*dc*	0729	SDM dci, 7 pob, Iridium		
24-Nov	Juliet	*rt*	0731	282/Flt Ops, McM to 13 Mile Camp, 2 souls, MO, etr 1200	1200	1204jc
24-Nov	Juliet	*rt*	0738	664/Flt Ops, McM to Castle Rock tomato, 1 soul, MO, etr 1700	1700	1410jc
24-Nov	Juliet	*rt*	0741	311/Flt Ops, McM to Castle Rock tomato, 2 souls, MO, etr 1700	1700	1349jc
24-Nov	Juliet	*rt*	0742	157/B-018, McM to Cp Royds, 4 souls, MO, etr 1700	1700	1221jc
24-Nov	Juliet	*dc*	0744	New Harbor dci, 6 souls, phone		
24-Nov	Juliet	*on*	0800	all ops normal		
24-Nov	Juliet	*dc*	0815	TDM dci, 20 souls, Iridium		
24-Nov	Juliet	*rt*	0833	B-041/4 snos, McM to Delbridges, TurksHead, Barne Crack, Cp Royds, 4 souls, MO, etr 1900	1900	1642jc
24-Nov	Juliet	*rt*	0833	316/B-134, McM to Cp Evans, 2 souls, MO, etr 1900	1900	1747jc
24-Nov	Juliet	*rt*	0843	156/B-041, McM to Delbridges, TurksHead, Barne Crack, Cp Royds, 3 souls, MO, etr 1900	1900	1644jc
24-Nov	Juliet	*on*	0900	all ops normal		
24-Nov	Juliet	*dc*	0908	G-063 dci, 9 souls, FP1		
24-Nov	Juliet	*dc*	0909	LB dci, 6 souls, phone		
24-Nov	Juliet	*rt*	0934	152/Andrill, SB transition to Andrill, 2 souls, MO, eta 1010	1010	1000jc
24-Nov	Juliet	*dc*	0941	G-295 dci, 2 souls, FP2		
24-Nov	Juliet	*cc*	0943	F6 open. 2 souls, B-421, dci 0900, phone		
24-Nov	Juliet	*rt*	0943	B-009/1 sno, BRI to McM, 1 soul, FP2, eta 1045	1045	1028jc
24-Nov	Juliet	*on*	1000	all ops normal		
24-Nov	Juliet	*od*	1002	WAIS overdue for check-in		

24-Nov	Juliet	*dc*	1004	WAIS Divide dci, 18 souls, Iridium		
24-Nov	Juliet	*od*	1004	called WAIS on Iridium (no joy on 7995). All OK.		
24-Nov	Juliet	*rt*	1018	152/Andrill, Andrill to SB transition, 2 souls, MO, etr 1055	1055	1047jc
24-Nov	Juliet	*rt*	1023	G-182/3 snos, McM to Cp Royds, MO, 3 souls, etr 2300. At 2256 rev etr to 2330	2330	2328mb
24-Nov	Juliet	*rt*	1028		1200	1115jc
24-Nov	Juliet	*rt*	1055	B-134/2 snos, McM to Cp Evans, 4 souls, MO, etr 1900.	1900	1721jc
24-Nov	Juliet	*on*	1100	all ops normal		
24-Nov	Juliet	*rt*	1100	154/B-134, McM to FH #1, 3 souls, MO, etr 1700. @ 1445 revised etr to 1800sk	1800	1724jc
24-Nov	Juliet	*on*	1200	all ops normal		
24-Nov	Juliet	*on*	1200	282/flt ops overdue for check-in. Hailed on MacOps; no joy.		
24-Nov	Juliet	*od*	1202	Hailed 282 on Fleet Ops; no joy.		
24-Nov	Juliet	*od*	1203	904/Flt Ops checked in; I asked them about 822.		
24-Nov	Juliet	*od*	1204	822 checked in. Back in town.		
24-Nov	Juliet	*on*	1250	Juliet off to Hamlet		
24-Nov	Hamlet	*on*	1300	All ops normal.		
24-Nov	Hamlet	*rt*	1307	B009/sno720 dep BRI for MCM, 1 pob, FP2, ETA 1415. @1320 revised eta to 1445sk	1445	1358jc
24-Nov	Juliet	*on*	1315	Juliet on for Hamlet		
24-Nov	Juliet	*rt*	1321	318/divers, McM to Intake FH# 15, 4 souls, MO, etr 1800. Were back in town ~1630 per Rob Robbins	1800	1819 mb
24-Nov	Juliet	*cc*	1350	G-054/Pierce Valley moved to Mullins Valley, 2 souls, dci 1000.		
24-Nov	Juliet	*on*	1400	all ops normal		
24-Nov	Juliet	*rt*	1402	B-009/1 sno, McM to BRI, 1 soul, FP2, eta 1530	1530	1432jc
24-Nov	Juliet	*ev*	1415	Brooke repeater is up and running !		
24-Nov	Juliet	*on*	1500	all ops normal		
24-Nov	Juliet	*on*	1600	all ops normal		
24-Nov	Juliet	*rt*	1657	314/B-009, BRI to McM, 3 souls, FP2, eta 1900	1900	1819mb
24-Nov	Juliet	*on*	1700	all ops normal		
24-Nov	Juliet	*on*	1700	all ops normal		
24-Nov	Macbeth	*rt*	1753	Sno(873-4)/B018 MCM to Lower Erebus Tongue, 2 pob, MO, etr 2300	2300	2103mb
24-Nov	Macbeth	*od*	1800	318 overdue, hailed on MO		
24-Nov	Juliet	*on*	1800	Juliet off to Macbeth, all ops normal		
24-Nov	Macbeth	*rt*	1802	157/B018 MCM to Lower Erebus Tongue, 2 pob, mo, etr 2300	2300	2104mb
24-Nov	Macbeth	*od*	1803	Paged SAR MC. He will call POC and other sar members		
24-Nov	Macbeth	*od*	1806	Paged Mac Ops supervisor		
24-Nov	Macbeth	*od*	1807	Hailed 318 on MO, I net, and Science frequencies		
24-Nov	Macbeth	*rt*	1807	Sno(875,878)/B024 HC to MCM, 2 pob, FP2, eta 1930	1930	1842mb
24-Nov	Macbeth	*od*	1813	paged POC		
24-Nov	Macbeth	*on*	1814	POC confirmed driver was back in town		
24-Nov	Macbeth	*od*	1818	Rob Robbins confirmed 318 was back in town		

24-Nov	Macbeth	*rt*	1845	508/Shuttels MCM to Cp EVans, 17 pob, MO, etr 2300. At 2215 extended etr to 0000. At 2330 rev etr to 0100. At 0008 revised etr to 0130	130	0126mb
24-Nov	Macbeth	*on*	1900	all ops normal		
24-Nov	Macbeth	*rt*	1925	152/Andrill SB to Andrill, 3 pob, MO, eta 1950	1950	1944mb
24-Nov	Macbeth	*dc*	1945	Cp Crozier dci, 4 pob, FP3		
24-Nov	Macbeth	*dc*	1953	Cp Bird dci,1 pob,FP2,		
24-Nov	Macbeth	*rt*	1954	Cp Royds dci, 2 pob, FP2		
24-Nov	Macbeth	*on*	2000	all ops normal		
24-Nov	Macbeth	*rt*	2003	152/Andrill Andrill to MCM, 5 pob, MO, eta 2050	2050	2033mb
24-Nov	Macbeth	*on*	2100	all ops normal		
24-Nov	Macbeth	*dc*	2107	BRI dci, 4 pob, phone		
24-Nov	Macbeth	*on*	2200	all ops normal		
24-Nov	Macbeth	*rt*	2201	156/Andrill SB to Andrill, 2 pob, MO, eta 2230	2230	2218mb
24-Nov	Macbeth	*rt*	2243	156/Andrill Andrill to SB, 2 pob, MO, eta 2315	2315	2302mb
24-Nov	Macbeth	*on*	2300	all ops normal		
24-Nov	Macbeth	*dc*	2309	HC dci, 4 pob, FP2		
24-Nov	Macbeth	*cc*	2358	I-159 left SDM,4 pob, Iridium, coordinates for camp KISX in field camp report		
25-Nov	Macbeth	*on*	0000	all ops normal; teac changed, computer restarted		

Daily Field Camp Report

Mac Ops maintains and distributes a *Daily Field Camp Report* which includes current camp information verified at the most recent daily check-in, or camp put-in. Suggested distribution for the report is listed at the end of this section.

— Operator sends the report every morning by 1000 hours (or earlier, after all morning check-ins are received).

— A hard copy of the camp report worksheet should be printed and kept at the console to record information as it is called in from camps.

— Operator updates the *Daily Field Camp Report* electronic file continuously throughout the day as information is received.

Edit Daily Field Camp Report electronic file

The operator transfers the hand-written information from the hard copy *Daily Field Camp Report* to the electronic file, and adds or deletes camps from the report.

1. Open the *Daily Field Camp Report* electronic file.
2. Enter the actual check-in times, and update POB and other entries as required.
3. Add entries for camp put-ins and delete those for camp pull-outs. (If a camp is temporarily unoccupied for a night, it should be removed from the Camp Report.)

4. Save the document.

Prepare Hard Copy for Next Shift

1. Open the *Daily Field Camp Report* electronic file.
2. Delete previous entries in the Actual Time and POB columns. (For day shift, leave previous evening actual check-in times).
3. Save changes.
4. Print a copy and place it on console. (This is the working hard copy used to record information received from camps.)

Note The day shift operator will pass down the most current version of the *Daily Field Camp Report* hard copy to the oncoming night shift operator. A current worksheet may be printed at any time during a shift. All printed data will be current, but the Actual Time and POB fields will always be blank. Information for those fields must be transcribed manually, if desired, onto the worksheet from the *Daily Field Camp Report*.

Table 2: Sample *Daily Field Camp Report*

Mac Ops Daily Field Camp Report

November 10, 2006

This report lists all field camps and their most recent communications check-in
(Actual check-in times are current date unless preceded by a prior date)

Total Personnel: 56 **Camp Locations: 12**

Camp Name	Leader	Sched Time	Actual Time	POB	Personnel Breakdown
Helo Supported					
Black Island	Byrd	0700	0654	3	3 RPSC
Cape Crozier	Kalva	0900	0709	3	3 B-456
Lake Bonney	Gulan	0800	0708	10	5 B-422, 2 B-425, 3 RPSC
Lake Hoare	Elnak	0800	0750	9	7 B-015, 2 RPSC
Marble Point	Dalos	0800	0652	2	2 RPSC
Minna Bluff	Bosla	2000	09.1955	4	4 I-191
New Harbor	Aporo	0900	0843	3	5 B-123
Fixed Wing Supported					
Fosdick Mountains	Pisten	0900	0605	3	5 G-081
Siple Dome	Bully	0800	0659	7	7 RPSC
Taylor Dome	Spryte	0930	0929	3	3 RPSC
Vehicle Supported					
Big Razorback Island	Hercules	2200	09.2148	7	7 B-009
Hutton Cliffs	Otter	0900	0717	2	2 B-197

Table 3: *Daily Field Camp Report* Suggested Distribution

Antarctic Sun	Mac Ops Supervisor
BFC Food Room	Mac Ops Systems Supervisor
BFC Supervisor	MEC Supervisor
Chalet Admin	NSF Admin
Chalet Senior Admin	NSF Science Representative
Crary Lab Assistant Supervisors	NSF Senior Representative
Crary Lab Supervisor	NSF Station Manager
Field Safety Training (all)	Operations Manager
Field Support Coordinator	Population Specialist
Fixed Wing Assistant Supervisor	Populations Specialist Assistant
Fixed Wing Supervisor	RPSC Station Manager
Helicopter Assistant Supervisor	Science Construction Foremen
Helicopter Supervisor	Science Construction Supervisor
Housing General Account	Science Support Manager
Housing Supervisor	South Pole Comms
IT Comms Admin	South Pole Comms Supervisor
Mac Ops	Weather Forecaster (ATS)

Vehicle Supported Camp Muster

The RPSC Population Specialist tracks personnel by name at various stations and field camps. Most personnel movement to and from field camps is available via aircraft manifest. For personnel traveling to field camps via vehicle, which do not keep manifests, the Population Specialist relies on the Mac Ops *Vehicle Supported Camp Muster.*

— The *Vehicle Supported Camp Muster* contains the following information:

- Name(s) of all vehicle supported camps including equipment shakedowns or other overnight parties, except the Field Safety Training Program (FSTP) Snowcraft overnight course, which is not tracked by Mac Ops
- Names of personnel at camp, including event number (or indicate RPSC or NSF)
- Distribution includes (but is not limited to): Population specialist, Chalet Administrator(s), Supervisors.

— The *Vehicle Supported Camp Muster* is sent daily by 1000 hours. It includes all camps listed in that day's *Daily Field Camp Report* in the Vehicle Supported section. If there are no vehicle supported camps listed, the muster is not sent.

— The *Vehicle Supported Camp Muster* is sent via e-mail document. List all members of a field camp in alphabetical order on the saved document and then edit by deleting or adding names as required before sending each day.

Mac Notes

The Communications Center maintains an electronic log called *Mac Notes*. The log provides the operator an opportunity to document event details, observations, questions, procedural changes and other general information pertinent to the work center operations. The *Mac Notes* also provides a consistent method of communication between Mac Ops personnel.

Daily Note Entries

To maintain the notes as an up-to-the-minute resource, the operator updates the document as necessary throughout the day.

1. Log on to the Mac Ops network account.
2. Open the current Mac Notes file.
3. Update the notes with the following:
    - Questions to supervisor or other operators concerning station operations and procedures
    - Contact and update information
    - Details of equipment malfunctions, emergency situations, operation tasking, or telecommunications concerns
    - Timely operational information requiring dissemination to all operators
4. Save the *Mac Notes* after each entry. This can be done quickly by pressing <Ctrl> S.

Note Use the "Find" tool to quickly locate a particular reference within the *Mac Notes*. Press <Ctrl> F. Within the Find and Replace window, enter the text to find. Press <Enter>.

Message Templates (for E-mail and Text Pagers)

E-mail message templates can be created in Outlook with a ".msg" file extension. Messages in this format can be sent to a pre-established distribution or with a pre-composed message. Message templates are useful for sending multiple text pages such as the SAR Uncertainty Phase or Distress Page messages, or for sending messages to predetermined distribution lists via e-mail.

For more information about Iridium text messages and templates, see the Iridium Phone Equipment Operation section.

Using a Message Template

— Open the message template

— Type any changes, additions, or deletions that you would like to appear in the message body

— <Send> the message

— A copy of the message appears in your Sent Messages folder

— The original message template remains unchanged

Creating a Message Template

— Open a new blank message in Outlook

— Ensure that the message is in plain text format (<Format> <Plain Text>)

— Multiple e-mail or pager addresses should be separated by semi-colon and a space

— Save as file type "message format"

- <File>
- <Save As>
- Browse for folder to save in (for example J:CommsOperations\Mac Ops\Message Templates)
- Type in desired file name
- Choose type "Message Format (*.msg)"

Editing a Message Template

— Open the template. (If it is Read-Only, that protection must be removed first; see below)

— Edit message body text as desired

— If making changes to pager addresses, be sure to click the save icon (or press ctrl-s) before moving cursor out of the address field. Otherwise (if you use Tab or the mouse to move out of the field first) the changes may not "stick" in the saved document. This seems to be an odd anomaly specific to this file format.

Protecting a Message Template as "Read-Only"

Any file can be set as a "Read Only" file to protect it from unintended changes.

— Do not open the file first.

— From the folder the file is in, right click the file name and choose "Properties."

— Check the box "Read Only."

— Click "Okay."

Read-Only protection can be removed by following the same procedure above and un-checking the box.

Equipment Operation

Communications Operations at McMurdo Station focuses on the operation and monitoring of HF and VHF radio and Iridium satellite phone equipment and operations. Each operator must develop a working familiarity with the following equipment-related processes.

Telephones

Some useful telephone functions are described here. Additional instructions are available from Telco.

Call Pickup

A phone call ringing at any extension in your pickup group can be answered at your phone. All Mac Ops extensions should be in the same group.

1. Pick up your extension (listen for dial tone)
2. Press # #
3. Answer call as you normally would
4. The call is now on your line and can be transferred back to original extension or another extension.

Call Hold

To place a call on hold from the Voice Communications Control and Routing system (VCCR):

1. Press <Hold> on VCCR screen
2. To take call off hold, press extension button

Call Back

Upon receiving a busy signal at a local extension:

1. Press <Ring Flash> (a broken tone follows)
2. If phone does not have Ring Flash, press switch hook once
3. Dial * 4 (a long tone follows)
4. Hang up

When the line is free it rings at your extension; when picked up, ringing at the other extension is heard. This function does not work with Crary Laboratory extensions.

Call Transfer

After answering an incoming call it can be transferred as follows:

1. Press <Ring Flash> (a broken tone follows)

2. Dial the transfer extension
3. Greet the party at transfer extension when they answer
4. Press <Ring Flash> (or "Transfer") *[See Note below]*
5. Hang up the line

Note: Step (4) is only necessary when transferring calls to a Crary extension. For simplicity it is recommended to include step (4) for all transfers. (For non-Crary transfers, step (4) engages a 3-way conference call briefly before operator hangs up.)

Transfers to dormitory rooms: Off-station Direct International Dialing (DID) calls generally can NOT be transferred to dormitory rooms. Telco intentionally blocks these calls to limit usage of limited off-station lines. Rooms of upper management personnel are often set up to receive off-station transfers. Iridium calls via sailor line CAN be transferred to any extension on station.

Conference Call

Use this function to connect yourself with two other phone parties, or to connect two phone parties on an HF phone patch. This method will not allow more than one "long distance" party, and parties can only be in the combination of two extensions and an outside line but not between one extension and two outside lines.

The following procedure is for VCCR phone lines:

1. Select a phone line (be sure to choose wisely if planning a phone patch)
2. Dial first phone party; ask them to stand by
3. Press Ring/Flash
4. Dial second phone party; ask them to stand by
5. Press Ring/Flash
6. Mac Ops and the two phone parties are now connected
7. To connect the two phone parties to HF patch, flip the corresponding Radio Telephone interface Unit (RTU) "connect" switch then hang up

Note The following conditions apply to all conference calls connected over the VCCR:

- Once a conference call is engaged it cannot be transferred
- Maximum capacity is initiator (Mac Ops) plus two additional parties
- This may not work with a Crary Laboratory extension

Iridium Phone

Note Complete information on Iridium phone features can be found in the Motorola 9500 Portable Telephone User's Guide.

This section overviews features of the Iridium telecommunications, providing global wireless telephony within the USAP.

The Iridium System relies on a constellation of 66 Low Earth Orbit (LEO) satellites, a network of ground-based gateway switching installations and ground stations to control satellite commands and telemetry. This system provides global, continuous telecommunication and includes commercial and government service providers. The USAP subscribes to Iridium primarily via the US Government's Enhanced Mobile Satellite Service (EMSS). EMSS is administered by Defense Information Systems Agency (DISA), the Information Technology (IT) organization for the Department of Defense (DOD). EMSS services are controlled by General Dynamics Decision Systems, from the DOD Iridium gateway in Wahiawa, Hawaii. EMSS Iridium units can be identified by 8816-762-XXXXX and 8816-763-XXXXX telephone numbers. Commercial Iridium services, which are sold and supported by Iridium Satellites LLC, use a Tempe, Arizona, facility.

The Iridium phones used at Mac Ops are portable units mounted in individual docking stations, each equipped with an external antenna mounted on the roof of Building 165. A Subscriber Identity Module (SIM) card containing a microchip that assigns the number of the phone and acts as its memory is installed in each docking station. The SIM card must be installed for the phone to operate. For instructions on inserting or removing the SIM card, contact a Communications Technician or consult the *Motorola 9570 Portable Dock User's Guide*.

Phone Symbols

The display screen features several icons that indicate characteristics of phone performance and basic modes of operation. Consult the *Motorola 9500 Portable Telephone User's Guide* or the Phone Symbols sheet for details. The Iridium phone must be kept in Satellite Mode, indicated by the globe icon in the lower-left corner of the display.

Note The house and globe icons should be visible when you look at the Iridium screen.

Current State of Service Light

The current state of service light is located at the top of the phone. With the keypad cover closed, this LED indicator provides information on the phone's service status. See the table below.

Table 4: Iridium Handset State of Service

If the LED is...	Then...
Alternating red and green	A call is incoming
Flashing green	The phone is receiving a signal from the Iridium satellite network. It's possible to place and receive calls.
Flashing yellow	The phone was not successful in registering with the satellite network and cannot receive incoming calls. Try again in a few minutes.
Flashing yellow and red	The SIM card may be inserted incorrectly, may not be inserted, or the user may be in a restricted area.
Flashing red	Service is not available.

Basic Functions

Power the phone as follows:

1. To power up the Iridium phone, press and hold the red circle button on the keypad.
2. To power down the Iridium phone, press and hold the red circle button on the keypad.

Note The phone must be powered up to receive calls. It is typically left activated at all times.

Answer the phone as follows:

1. To answer the phone in speakerphone mode, open the keypad cover on the phone and speak. If the unit does not have a keypad cover, simply choose "OK" on the handset to answer it.
2. To answer the phone in private mode, lift the handset on the left side of the portable docking unit.

Place a call as follows:

1. Open the keypad cover and dial the target number.
2. The display inquires "CALL?" Press OK.
3. The number being called is displayed.
4. The call is placed in speakerphone mode. For a private conversation, pick up the handset on the left side of the portable docking unit.

Note To redial the last number called, press OK twice.

To place a call using the speed-dial function:

1. Open the keypad cover and press MR (Memory Recall).
2. Press the number assigned to the number programmed in memory.
3. Press OK.
4. The full Iridium number is displayed with a "`Call?`" prompt. Press OK and the phone dials.

To end a call:

1. Place the handset in the docking cradle. To end a call in speaker mode, press the "OK" button or close the flip lid on the docked phone.
2. The duration of the call displays for five seconds.

Message Services

It is possible to send short text messages (120 characters maximum) to another Iridium phone via e-mail. If the Iridium phone is turned On, the phone sounds a short ring to alert the user of the incoming message. If the Iridium phone is turned Off, the message is delivered the next time the phone is activated and establishes satellite contact. This allows a backup method of alerting field parties of an important alert.

Voice mail messaging is also available with the Iridium phone. However, the service is currently not recommended, as field camp personnel historically have found it difficult or impossible to retrieve the messages.

Send Iridium Text Message using Website

1. Access the Internet address: http//inah.pac.disa.mil/
2. Enter the Iridium phone number of the recipient in the Iridium Handset Number field. Type the message in the Message field. Select the Message Size field to confirm the message is less than the 120-character limit.
3. For message confirmation, enter the work center's e-mail address in the confirmation field.
4. Select Send. A successful confirmation screen appears. Be advised that receiving the confirmation is not a guarantee that the message has been delivered or read.

Send Iridium Text Message using E-mail

1. Address an e-mail to the twelve-digit Iridium phone number @inah.pac.disa.mil (For example, to send to the Mac Ops Iridium, the e-mail address is: 881676312464@inah.pac.disa.mil).

Note To appear correctly on the Iridium display, the e-mail message format must use plain text only. (Select Format | Plain Text.)

2. In the message body, enter a short text message beginning with the date and time. Message size is limited to 120 characters. As messages are not always delivered immediately, this allows the phone user to recognize if the message is still current.

3. Send the e-mail. When the text message is successfully received, the sender receives an e-mail response from SMS Daemon with the subject line `Page delivered`. Be advised that receiving the e-mail response is not a guarantee that the message has been delivered or that it has been read.

Note Do not enter text in the subject line, as it will not be displayed.

Receive a Text Message

A ring in a pattern of three successive three-tone beeps indicates an incoming message. The LED displays: `Message Read Now?`

1. Press OK. Use the MENU button to scroll through the message one screen at a time, or press C to read the message later.

2. When a message is not viewed immediately after arriving, an envelope icon appears in the lower, left corner of the LED, indicating a stored message. To view a stored message, press the MENU button and scroll to the Messages menu.

3. Press OK. Scroll to Received Messages. Press OK. The message is displayed.

4. After viewing a message, press OK. The screen displays: `Delete Message, Select?`

5. To delete, press OK. To save, press C twice to return to the Iridium display.

Iridium Sailor Line

Mac Ops and the Emergency Operations Center (EOC) have access to an Iridium Sailor line. This gives the capability of making Iridium-to-Iridium calls using the local phone system. Generally Mac Ops uses the line for outgoing calls; however all Mac Ops and EOC phone lines can access the sailor line.

To dial an outgoing call from a Mac Ops or EOC phone line:

1. Dial 778. You should hear a tone; if a busy signal is heard, the line is engaged by another user and is unavailable.

2. Dial 000 (3 zeros)

3. Dial the full 12-digit Iridium number that you are calling

4. Dial "#"

Incoming sailor line calls ring on extension 2586, but outgoing sailor line calls can be dialed from any extension.

Related References

Motorola 9500 Portable Telephone Users Guide

Motorola 9570 Portable Dock Users Guide

High Frequency Radio Equipment

VCCR – Position Functions and Set up

There are two Voice Communications Control and Routing (VCCR) operator positions located in Room 212 (Mac Ops) and one in Room 210 (Mac Ops Remote). Each VCCR position consists of a touch-screen operator console, three speakers, an audio control unit, JPS Radio-Telephone Interface units to enable HF phone patches (not on Mac Ops position 2), Dell Optiplex computer, and a Position Electronics component. The operator makes selections on the touch-screen positions to access HF radios, phone and intercom functions.

This section outlines the basic functions and setup of the VCCR consoles.

The operator uses the HF radio equipment to transmit and receive on frequencies used for field camp and ship-to-shore communications, and to provide phone-patch conferences upon request. The VCCR provides the operator with remote access to the radio equipment and also functions as a telephone.

Each of the three operator-position touch screens features four pages, with each page featuring a file-index tab at the bottom of the touch screen. The four pages are: MAC OPS, OPS REMOTE, FP OPS, and Local Rx. All pages display the phone functions. To toggle between pages, press the corresponding tab at the bottom of the screen.

Any change to any frequency group on a given VCCR page at one position is reflected on the corresponding page on all other positions. For example, changes made to the Mac Ops page from the Mac Ops Remote position indicate on the Mac Ops pages on both Mac Ops positions. An exception is that the selection of the buttons for transmit and receive will not show on, or affect, the other positions.

Note Because changes to a page are registered on all positions, permission must be requested from Mac Ops before working on the Mac Ops page. The Communications Technicians must notify Mac Ops when work is complete on the Mac Ops page, allowing Mac Ops to reselect the frequencies to monitor.

Mac Ops Remote Page

The Mac Ops Remote page consists of two groups of HF frequency buttons (labeled Mac Ops 4 and 5), intercom call buttons, open phone buttons, two I-Net boxes, one Air Traffic Control (ATC) HF box, and a static page menu.

Note The Static Page refers to the options box to the left of the screen.

Mac Ops Page

The Mac Ops page consists of three groups of HF frequency buttons (labeled Mac Ops 1, 2 and 3), intercom call buttons, open phone line buttons, and a static page menu.

Mac Ops and Mac Ops Remote each have phone functions specific to the work center. These functions remain displayed, no matter what page is viewed. Mac Ops Remote has five

intercoms and two open phone lines, while Mac Ops has four intercoms and four open phone lines.

Groups (Channel Control Windows)

Each position console displays two or three channel-control windows, each referred to as a "Group," allowing the operator to select an HF frequency, or channel. Each Group features four or eight frequency buttons, transmit and receive buttons, Radio Frequency (RF) gain control buttons, squelch control buttons, a handset/speaker button, a group volume indicator, and several antenna selection buttons.

Mac Ops Remote Position

The Mac Ops Remote Position features two Groups, labeled as: Mac Ops 4 and Mac Ops 5. Each group has one "work" frequency (for receive and transmit) and two "guard" frequencies (for receive only).

- Mac Ops 4 features three of the Antarctic Common frequencies, one HF non-voice (RTTY) frequency, and four Radio Control, Operation, Maintenance and Management (RCOMM) channels that can be assigned to frequencies in the USAP frequency pool.
- Mac Ops 5 features the three Antarctic Common frequencies, three ship-to-shore frequencies, one frequency used by Mario Zucchelli Station at Terra Nova Bay, and one RCOMM channel.

In addition to the HF groups, the Mac Ops Remote Position page features four other, smaller boxes.

- The box labeled ATC HF allows the operator to monitor the primary flight-following frequency. This feature has no transmit capability.
- The last two boxes are both labeled I-Net. Within the two I-Net boxes are receive buttons, a group volume indicator, and a speaker/handset button. One box features a transmit button.

Note It is necessary to have two I-Net Receive buttons, thus allowing the Mac Ops Remote operator to receive all I-Net transmissions. If there were only one, then the operator would not be able to hear I-Net transmission made from other VCCR positions, such as Mac Center or Raven Ops.

Mac Ops

Mac Ops features three Groups, labeled as: Mac Ops 1, Mac Ops 2, and Mac Ops 3. Each group has one "work" frequency (for receive and transmit). Mac Ops 1 has two "guard" frequencies (for receive only), while Mac Ops groups 2 and 3 have only one guard frequency.

- Mac Ops 1 features eight frequency buttons, including the Antarctic Common frequencies, as well as those used by Scott Base, Mario Zucchelli and Vostok stations. It also features an RCOMM channel, which may be programmed to any frequency in the USAP frequency pool.

- Mac Ops 2 and 3 each feature four frequency buttons, including the three Antarctic Common frequencies and an RCOMM channel.

Screen Functions

Descriptions follow regarding the various functions of each touch-screen button within the Groups. The operator presses each button to trigger a series of tones (typically inaudible to the operator) sent to the radio equipment indicating the selection.

Frequency Selection

- Each group is equipped with a Work frequency, which is a receive-and-transmit channel. The operator selects the Work frequency by pressing the channel button of the desired frequency on the touch screen. The Work channel is heard through either the Work speaker or the position handset.

Note The channel button selected as the Work frequency appears light gray.

- Each group is equipped to "guard" either one or two additional frequencies. Such Guard channels are receive-only and are heard through the Guard speaker. The Guard audio cannot be monitored through the handset. The audio for the guard channel(s) is made up of the receive component of the last one or two Work frequencies selected. The number of guard frequencies available varies by group. Mac Ops 1, Mac Ops 4 and Mac Ops 5 have two Guard channels. Mac Ops 2 and 3 have one Guard channel each.

Note A blue bar appearing to the right of a channel button identifies it as a guarded frequency.

Group Volume

The volume level of a Group is indicated by a red bar to the left of the speaker/headset icon button at the top of each Group box. To adjust the volume of a Group, select the group first such that the header bar is blue. Use the VOL UP and VOL DOWN buttons on the Static Page to adjust levels. For more information, refer to the "Static Page" section of this guide.

Antenna Selection

Each group has a dedicated omni-directional transmit antenna and can select from the following receive antennas. Once selected, the antenna button appears highlighted.

- OMNI: Multi-directional, all-purpose antenna good for daily operations.
- SP RHOM (South Pole Rhombic): Directional antenna that is positioned to receive from the south.
- LOG (Log Periodic): Directional antenna that is positioned to receive short-range frequencies from the west (i.e., the Dry Valleys).

- CH RHOM (Christchurch Rhombic): Directional antenna that is positioned to receive from the north.

Additionally, the operator may select:

- PALMER: Found only on Mac Ops 4, it is useful for long-range communications with Palmer Station.

Speaker vs. Handset

At times it may be difficult to hear a party through the speaker due to background noise or poor propagation. In such cases, the operator may choose to listen through the handset. To switch between the speaker and handset, touch the speaker button located above the "RX" button within each group. The speaker symbol indicates the audio for the work channel is routed to the speaker. The headset symbol indicates the audio of the work channel is routed to the handset.

Squelch On/Off (SQ ON, SQ OFF)

The squelch function reduces the amount of extraneous noise received due to static charges, HF propagation and atmospheric conditions.

The squelch buttons do not change color when selected. As a result, there is no visual cue to determine if the squelch is On or Off. Generally, the squelch is left turned On during normal operations to reduce background noise. However, during a phone patch, it is necessary to turn the squelch Off. Press the <SQ OFF> button prior to each phone patch.

Gain Up/Down (↑RF, ↓RF)

Gain is the sensitivity of a selected antenna. It's important to check gain levels at least every three hours, or as propagation conditions necessitate.

To adjust the strength of the signal, touch the ↑RF (increase gain) or ↓RF (decrease gain) buttons. If a calling party's signal is weak, increasing the RF gain may improve the ability to hear the transmission. Therefore, to pull in a weak signal, increase the gain. Increasing the gain increases the signal strength; however, it also increases any background noise on that frequency. To reduce excessive background noise, decrease the gain.

The red sound wave symbol in the upper, left corner of each group is an indication the RF gain is correctly set. If the sound wave has disappeared, weak signals may not be heard and the gain should be increased.

There are two methods to adjust the RF gain:

1. Select the frequency to adjust.
2. Pickup up the handset. Touch the speaker icon to hear the receive signal via the handset.
3. Turn Off the squelch.
4. Listen to the sound level of the frequency.
5. Increase or decrease the gain and listen to the difference in the sound.

6. Continue until reaching an appropriate sound level.
7. Turn On the squelch. The frequency's sound level will diminish.
8. Repeat Steps 1 through 7 for each frequency in the group, approximating an equal sound level for each frequency.

Alternately, it's possible to adjust the gain as follows.

1. Turn Off the squelch.
2. Using the red sound wave symbol as a guide, repeatedly select the ↓RF button (reduce gain) just until the red sound wave symbol disappears.
3. Select the ↑RF button (increase gain) continually three to four times.
4. When finished adjusting the gain, turn the squelch back On.

Note The gain must be adjusted separately for each frequency within a group. The volume level for all guarded frequencies must be similar.

Receive (RX) and Transmit (TX)

RX is turned on and off by touching the RX button in a group. When the receive function is enabled, the RX button is green and the selected Work and Guard channels are monitored. When RX is Off, the button is gray and no channels are monitored in the respective frequency group. The receive function can be turned On to monitor frequencies without enabling the TX function for the Work channel.

TX is turned On and Off by touching the TX button in a group. When TX is On, the button is red and transmit capability is enabled for the Work frequency only in the respective group. When TX is Off, the button is gray. The TX button is coupled to the RX button within each frequency group. Turning on TX in a group will automatically turn on RX in the same group, if it is not already activated.

When transmitting, a lightning bolt appears just below the red "sound wave" buttons in the channel group.

Note Avoid selecting TX in more than one group on the same console, as it will result in a simulcast to all work channels of the respective groups when transmitting.

Daily Set Up – Mac Ops Remote Position

Operator selects six frequencies to monitor each day. The three Antarctic common frequencies are monitored at all times. The other three frequencies vary during the season and are determined by anticipated radio traffic. Antenna selection depends on propagation and is subject to change. Normally, the Omni antenna is selected for both groups.

Daily Set Up – Mac Ops Positions

Mac Ops has created a uniform configuration for Daily Set Up. The HF positions should reflect the following configuration at shift change. It's not necessary to maintain the set up during the operating shift.

Selected work and guard channels in a group on one position are automatically selected in the same group on the other position, with the exception of RX and TX. Position 1 is the primary work position.

At shift change, the positions should reflect the following configuration:

- Mac Ops Group 1 – Either 7.995 MHz or 11.553 Megahertz (MHz) is selected as the work frequency, with the other selected as a guard frequency. The second guard frequency is RCOMM3. TX and RX are selected on Position 1, but not Position 2.

Note Prevent having TX and RX selected on both positions, as it results in feedback and may interfere with communications.

- Mac Ops Group 2 – This group is primarily used for phone patches. To eliminate feedback, RX and TX should not be enabled in Group 2 while performing a phone patch. During a phone patch, the desired frequency channel and SQ OFF (squelch off) should be selected.
- Mac Ops Group 3 – 4.770 MHz is selected as the work frequency and RCOMM5 (9.032 MHz primary flight following) is selected as the guard frequency. RX and TX are selected on Position 2, but not on Position 1, to eliminate any possible feedback.

Note With RX and TX selected on different positions, frequencies are separated to different speakers. As a result, the monitored frequencies are heard on four speakers, instead of two.

- Antenna selection depends on propagation and is subject to change. However, during normal operations the antenna is typically set to Omni for all groups.
- The touch-entry display (TED) screen is calibrated at the beginning of each shift. Refer to the VCCR Maintenance section of this guide.

Phone Buttons and Keypad

Each console page includes seven phone buttons.

The Mac Ops Remote position has two open lines for phone calls using the keypad on the console. Mac Ops has four. These are labeled with an extension number and a telephone icon.

The remaining buttons are used as intercom phones and are labeled with a destination and headset icon. These ring directly to the destination when activated.

For example, to call Raven Ops, press RAVOPS.

To call any other location, select an open phone line and dial the target number using the keypad.

To end a call, press the phone line button again.

Note Pressing the phone icon on the Static Page also ends an open phone-line call.

The phone keypads for the Mac Ops and Mac Ops Remote pages exist on the console below the display screens. Each consists of the usual numbers and symbols found on a conventional phone and is operated similarly. Several buttons are found on the top edge of the phone pad: TEST, up and down buttons for scrolling through options on the display, and an ENTER button. The keypads for the FP OPS page at Positions 1 and 2 and for the Local RX page at Position 3 exist on the pages themselves. This configuration is slightly different than the keypad on the console below the display screen. Several buttons are found on the right edge of the phone pad: TEST, green up and down arrows for scrolling through options on the display, and ENTER signified by a black arrow. These buttons are used for performing various position tests and are not typically used by the operator. For more information regarding such tests, refer to the *Liberty-STAR Touch-Screen Operator Manual* in Mac Ops Remote.

VHF Functions at the Mac Ops Remote position

The Mac Ops Remote position features two boxes applicable to VHF. This section describes the function of the VHF boxes.

Note The VHF buttons function identically to the HF Groups detailed earlier.

I-NET

The Mac Ops Remote position has the ability to transmit and receive on the I-Net. Within the two I-Net boxes are receive buttons, a group volume indicator, and a speaker/handset button. One box features a transmit button.

Note It is necessary to have two I-Net boxes, thereby providing two receive buttons. This allows the operator to receive all I-Net transmissions. If only one receive button is green, then the operator will not hear transmissions made from other operators' positions, such as Mac Center or Raven Ops. While the VCCR has I-Net capabilities, Mac Ops Remote may also transmit and receive on a VHF I-Net phone.

Static Page

Menu

The MENU button provides access to the toolbar drop-down menu. To view the toolbar, press MENU. Pressing MENU a second time hides the tool bar. For a complete description of the menu functions, refer to the VCCR Maintenance section of this guide.

Group Volume Control

The VOL UP and VOL DOWN buttons on the Static Page allow the operator to change the volume levels of the frequency groups. The Group's volume level is indicated by a red bar to the left of the speaker/headset icon at the top of each Group box. To adjust the volume of a Group, follow the steps below.

1. Touch the screen anywhere inside the desired Group. A blue bar appears and highlights the box title indicating the Group is selected.
2. Press either the VOL UP or VOL DOWN control button on the Static Page. The red bar in the selected Group reflects the volume adjustment.

Note This process adjusts the volume of the entire Group, not only the Work and Guard frequencies.

Volume Control

The Volume Control button duplicates the volume control knobs found on the audio-control unit and speakers. Pressing VOLUME CONTROL pulls up a screen with five, adjustable volume levels.

- OPERATOR, SUPERVISOR, and CHIME adjust the volumes on the audio-control unit.
- A/G SPEAKER adjusts the volume of the work speaker.
- G/G SPEAKER adjusts the volume of the phone speaker.

The knobs on the audio-control unit and speakers override any adjustments made on the volume-control screen.

For example, if the knob on the work speaker is set at a low level, by increasing the volume through the volume-control screen, the sound coming out of the work speaker increases. Turning the knob to a higher level first lowers the level on the volume-control screen until it matches the level indicated by the knob on the speaker.

Handset/Speaker Phone

The Static Page features a button labeled GG HS-LS (Ground-to-Ground Handset-Loud Speaker). When the button displays a headset, the phone call is heard in the handset. When it displays a speaker symbol, the phone is heard on the speaker.

This button defaults to the speaker setting when the program is restarted.

Place a Call on Hold

The HOLD button allows the operator to place a call on hold. To use the hold feature, follow the steps below.

1. With a call in progress, press the HOLD button. An hourglass appears on the phone extension button.
2. To release the call from hold, press the phone extension button.

End a Telephone Call

To end an open phone line call, touch the phone extension button.

Speed Dial Function

Follow the steps below to use the speed dial option:

1. Press the SPEED button. A list of pre-programmed numbers appears in a box on the screen.
2. Select the number to dial by touching the target number, then press the DIAL button in the box. The number automatically dials.

Note If the number dialed requires a Personal Identification Number (PIN), listen for a tone and manually enter the PIN.

Transfer a Call

The RING/FLASH button allows the operator to transfer a call.

1. With a call in progress, press the RING/FLASH button.
2. Input the number of the target extension using the keypad.
3. When the party answers, introduce the call and press the phone extension button to hang up. This completes the call transfer.

Note Pressing Ring/Flash a second time returns the initial caller to the call group, resulting in all three parties on the line. The operator may retreat from the call by pressing the phone extension button.

Local RX Page (Mac Ops Remote Position)

The Local Rx page includes four boxes featuring receive buttons only. These are wired to Harris Receivers 1 through 4 and allow the operator to monitor those receivers through the work speaker at the VCCR console.

Related References

HF Mac Ops Remote Operation section of this guide

VCCR Maintenance section of this guide

Liberty-STAR Touch-Screen Operator Manual

VCCR - Maintenance

This section details procedures for daily and weekly maintenance of the Voice Communications Control and Routing (VCCR) operator positions. The operator performs daily and weekly maintenance to ensure optimal VCCR performance.

VCCR Warning Indicators

The McMurdo Station HF System consists of two network loops. The Mac Ops Remote and Mac Ops positions exist on one loop, while Mac Center, Raven Ops and the Control Tower operator positions are found on the second. A Node Multiplexer (NodeMux) mounted in the far left column of HF racks connects the two loops.

Three round dots are found on the lower, right corner of the VCCR touch screen and are labeled: TOUCH, PP and DATA. These dots should be green at all times. Should one or more of the dots turn yellow or red, it is an indicator of a problem with one of the positions in the Mac Ops Remote/Mac Ops loop.

- A yellow dot indicates a problem with another position on the loop.
- A red dot indicates a problem with the position displaying the red dot.
- It is acceptable for the dots to shine yellow during the program startup, until the program is fully loaded.

A short description follows regarding each dot's function.

Touch

The Touch dot represents the Touch Software for all touch controllers. A yellow or red dot indicates a problem with the software.

Position Peripheral (PP)

The Position Peripheral dot represents the Position Electronics (PE). Each operator position has a PE. Each PE has four cards called Peripherals. A yellow or red dot indicates a problem with a Peripheral.

Data

The Data dot represents the network loop's data lines, which enable the operator positions to communicate between positions and with the NodeMux. A yellow or red dot indicates a problem with the communications between two positions, or between a position and the NodeMux.

Calibrate the VCCR Touch Screen

It's important to calibrate the touch screen periodically, or whenever the touch-screen selection becomes difficult.

1. On the VCCR console, if the taskbar displaying "Console," "Edit," " View," and "Help" is not displayed, select Menu on the static page.
2. Select Console on the bar to produce a drop-down menu, then choose Calibrate Touchscreen.
3. When the red and white targets appear on the screen, select each, touching as close to the center as possible.
4. When no more targets appear, follow the directions in the center box.

5. When satisfied, select Yes. The VCCR screen appears immediately.
6. Select Menu on the Static Page to return the screen to normal appearance.
7. Verify that the RX button is still selected on the touch screen, as well as the desired antennas and work and guard frequencies.

Clean the VCCR Touch Screen

Warning! *Absolutely no liquids should be sprayed onto the screen. Drops of liquid entering the bottom of the screen may cause irreparable damage.*

The following process describes the proper method for cleaning the VCCR touch screen.

1. Power off the console display. Powering down the screen to clean it will not interrupt frequency monitoring. The selected work and guard frequencies are still audible on the speakers.
2. Use a dry, lint-free cloth (such as a lens cloth) to wipe the screen.
3. If the finger smudges cannot be removed with dry cloth, use an alcohol wipe. Pat the wipe in a dry towel to remove excess liquid before cleaning the screen.
4. When the touch screen is clean, press the touch-screen console power-button to restore the display.

Related References

Liberty-STAR Touch Screen Operator Manual, CML ATC Technologies

HF Phone Patch

The operator provides HF phone patches linking telephone callers using the JPS Communications Radio Telephone Interface unit (RTU) to the USCGC, South Pole Station, or deep field camps.

Equipment Overview

Each group on the VCCR, except Mac Ops 4, features a corresponding phone line capable of an HF radio-telephone patch, using the RTU phone patch units. Mac Ops 1, 2, and 3 correspond to Ext. 2908, 2912, and 2907, respectively. Mac Ops 5 corresponds to Ext. 2429.

Following are the settings for normal operation of the JPS Communications RTU-200 Radio Telephone Interface unit:

Table 5: JPS Communications RTU-200 Radio Telephone Interface

Power	**ON** (red LED light)
Duplex Mac Ops Remote Position	Switch set at **Half**
Transmitter Keying	**KEY** set to middle position

switches	**MANUAL** set to **VOX**
Telephone Line	Set to **DISCONNECT** (Phone patch is not enabled)
Monitor knob	Not used
Keyed indicator light (red)	Displays when console handset or microphone is keyed to transmit

To enable a phone patch, the Telephone Line switch is set to CONNECT. A green LED light indicates the patch is enabled. The yellow Peak Level light flickers in accordance with audio levels over the phone line.

HF Phone Patch Instruction

Use the following steps to enable an HF phone patch:

1. Select the desired channel/frequency on the VCCR group that corresponds to the phone line to be used.
2. If the phone party is not standing by on the phone, select the extension on the HF position and dial the requesting party's extension.
3. When the phone party is on the line, pass along the following guidelines.
    - The phone party initiates the conversation by hailing the radio party.
    - Conclude transmissions with "Over."
    - Wait two to three seconds after the radio party says "Over" before beginning transmission.
    - Advise that loud background noises and breathing into the phone receiver can key the microphone and interfere with the radio party's transmission. Frequent pauses and hesitation in speech also results in poor performance as the vox key feature tries to interpret the beginning or end of a transmission.
    - Advise the phone party to wait five seconds after the phone patch is connected before hailing the radio party. When the phone party hears a burst of static in their handset, they may begin transmitting.
    - Advise the phone party to hang up when the conversation is finished.
4. Press SQ Off.
5. Set the telephone line switch on the RTU to CONNECT.
6. Press the phone extension button on the position to hang up. The operator must hang up the extension to complete the connection.

Note Phone parties hear their own voices in the telephone handset at a half-second delay. If squelch is On, the delay is longer and makes speaking difficult. Verify that squelch is Off.

7. To monitor the phone patch, select Receive for the phone patch frequency on any group.

8. To join the phone patch, select Transmit on any VCCR group, after verifying the correct frequency is selected, and key the handset.

9. When the patch is finished and the phone party hangs up, a busy signal sounds. Set the Connect/Disconnect switch to DISCONNECT and reset the squelch if needed.

If excessive feedback is evident during a patch, and procedures above were followed, the operator can manually key the phone party using the following steps:

1. Set the Manual/VOX keying switch to Manual.

2. When the radio party completes a transmission, set the key switch to the Up (locked) or Down (momentary) position.

Note The momentary position requires the operator to press the key throughout the entire transmission, whereas the locked position remains without any pressure.

3. When the phone party completes a transmission, set the key switch back to the middle position.

4. Repeat Steps 2 and 3 until the conversation concludes.

RT-7000 Transceiver

The RT-7000 transceiver in Room 210 (Mac Ops Remote) operates as a stand-alone transceiver with the ability to retrieve any frequency necessary. It is used in normal operations to troubleshoot HF radio problems, communicate with South Pole Station, or to monitor and communicate via frequencies not available on primary HF circuits. It also serves as a backup for Mac Ops and Mac Center in emergency situations, such as a power outage or primary HF circuit failure.

The RT-7000 uses the conical monopole antenna below Building 165 to transmit and receive. A remote head for the RT-7000 is installed in Mac Center. The transceiver power supply is connected to the Uninterruptible Power Supply (UPS) unit for Building 165. If primary power to building 165 is interrupted, the RT-7000 remains operational.

Operation Instructions

1. Verify all front panel switch positions. Ensure the power switches on both the power supply and amplifier are switched on. Set the following parameters:
    - Power knob to SPKR
    - MODE to USB
    - ATTN (attenuation) to OFF
    - EXT AMP (external amplifier) to ON
    - SQ (squelch) to ON or OFF as desired by operator

Note To change the settings above, use the Function knob to toggle to the desired option. Press the STATUS button to change the setting. To change Mode, toggle the Mode knob.

2. To select a specific preset channel, press C, the channel number, and E. The channel and frequency appears on the display.

Note Refer to the list of preset channels attached to the RT-7000.

3. To free tune any frequency, press C, press 0, press E, press F, the desired frequency, and E to enter the selection. (Not pressing C, then 0 before entering the frequency reprograms the current channel.)
4. To scroll through the programmed channels, press C and the up or down arrows on the keypad.
5. To program a channel, press C, enter the channel number, press E, press F, enter the frequency and press E to enter the selection.

Maintenance

In the event of a primary power fluctuation, the fuses from the power supply may blow. If a 'brownout" or an extended power outage occurs, contact the Communications Technician.

Mac Center Remote Head

The RT-7000 remote head installed in Mac Center allows the Air Traffic Controller to use the RT-7000 in the event of transmitter failure. The remote head display and RT-7000 display mirror one another. When Mac Ops or Mac Center changes any of the settings from either end, it is reflected on the other. Mac Ops has primary use of the RT-7000. Mac Center may conduct morning radio checks without prior notification, but coordinates all other use of the RT-7000 with Mac Ops. In the event of a transmitter failure, Mac Center notifies Mac Ops when it assumes control of the RT-7000.

VHF Radio Operations & Equipment

The operator utilizes VHF radio communications for science operations, administrative operations, industrial control, and disaster control.

This section lists the channels used at McMurdo Station and describes the intended functions of channels commonly used by Mac Ops. This material is provided here for informational use only and is governed by the *USAP Communications Plan.*

Simplex Frequencies

VHF radio signals propagate using surface waves traveling line-of-sight from one point to another. Unlike HF radio signals that use the ionosphere to propagate over long distances, VHF radio signals are line-of-sight only. Therefore, VHF is only useful over short distances. The short-range of VHF is often limiting for field party communication.

To increase the broadcast range of a VHF radio signal, it is possible to use a simplex radio system that involves placing antennas at higher locations. A prime example is the radio setup

at Mac Ops. From the work center at Building 165, the operator transmits and receives signals to and from the surrounding McMurdo Station area using an antenna at the McMurdo Transmitter Facility (T-Site). Mac Ops is hard-wire connected to the remote antenna. The frequency remains the same during transmit and receive. It is only the increased "visibility" of the antenna that improves the broadcast range of the VHF signal.

Repeated Frequencies

A repeated VHF system takes the concept of expanding the broadcast coverage one step further by repeating or re-broadcasting the signal on different frequencies. The VHF signal is transmitted on one frequency, received by a mountain-top antenna on the same frequency, then is rebroadcast using a different frequency. Finally, the remote party on the second frequency receives the transmission. To access the repeater antenna, the frequency is programmed with a tone guard, a signal for the repeater to "open" and accept a transmission. The result is a radio channel that uses one frequency to transmit, one frequency to receive, and is encoded with an individual tone guard for each repeater. The VHF radio signal is then able to reach more remote and distant locations using mountain-top repeater antennas.

Note Operator tip: When using repeated frequencies, key the microphone for one to two seconds before speaking. Otherwise, the start of the transmission is missed. When transmitting, speak in smooth, continuous speech patterns. Any gaps in conversation cause the repeater to turn Off and results in a loss of communication.

McMurdo Station uses several repeater networks to expand the VHF radio communication area. The duplex channels which utilize repeaters can be identified in Tables 6, 7, 8, and 9 by recognizing that the transmit frequency differs from the receive frequency.

Repeater Power Sources

The repeaters for Mac Ops and Movement Control Center (MCC)/Fleet Ops channels are both located on Crater Hill above McMurdo and are powered by T-Site (the transmitter site).

All repeaters with the exception of Wright Valley and Black Island (not Mt. Aurora) are powered by solar panels with battery storage. During periods of heavy cloud cover, batteries may drain faster than they charge if use is heavy; therefore, excessive transmissions should be avoided during these periods. Additionally, snow cover on the solar panels may impede recharging entirely until the snow melts. Continued "broken" transmission quality often indicates a low repeater battery.

The Wright Valley repeater is powered by a generator at the Air Force Technical Applications Center (AFTAC) site. This has proven to be a very reliable power source, making this a preferable repeater to use if available.

Black Island Repeater (Mt Aurora back-up)

There is an additional repeater located at the BITF (Black Island Telecommunications Facility). This serves as a backup to the Mt. Aurora repeater during times of malfunction or low battery power, or as an alternative during winter and winfly before the Mt. Aurora repeater is deployed. Operators can use the Zetron Dispatch Console to remotely switch

between the repeaters. This change is transparent to radio users, except for a possible change in line-of-sight coverage depending on the users' location. Regardless of which repeater is in operation, operators should refer to the channel as "Mt. Aurora" to avoid confusion for radio users, however the alternate is differentiated as the "Black Island" repeater amongst operators.

VHF Channel and Frequency Plan Descriptions

Four frequency plans exist at McMurdo Station, with each radio programmed for a specific plan. The plans are designed to incorporate all frequencies needed for the duration of the season. Some frequencies are simplex and some repeated. Some are frequencies used by the New Zealand Antarctic Program. RPSC personnel and science groups are issued radios featuring the particular frequency plan most useful to them. The following is a description of the intended use of most frequencies and a list of USAP frequency plans.

Although requirements may vary throughout a season, Mac Ops generally monitors the following VHF channels at all times: I-Net, Fire, Mac Ops, and all field party repeaters.

VHF Channel Descriptions

Simplex channels (line-of-sight)

- **I-Net**: For use by in-town departments including shuttles, Raven Ops, and Mac Center.
- **Fire**: For use by the McMurdo Fire Department
- **Science**: For use among field parties communicating by line of sight.
- **Helo Ops**: For communications between the helo hangar, helicopters, and helo field parties. (Not flight following.)

Duplex channels (using repeaters)

- **MCC/Fleet Ops**: Used by Fleet Ops, MCC, and Skier Maintenance; located on Crater Hill above McMurdo Station.
- **Mac Ops**: Repeater is located on Crater Hill above McMurdo Station. Used by Mac Ops for regional checkouts, by the Waste and Supply departments, and by the Medical department during routine patient transports or emergency scenarios.
- **Taylor Valley** (Field Party Operations [FP Ops]): Repeater is located on Mt. Coates and generally provides coverage for field parties in the Taylor Valley and some other areas.
- **Wright Valley** (FP Ops): Repeater is located on Mt. Newall and generally provides coverage for field parties in the Wright Valley, New Harbor, other Dry Valleys locations, and most sea ice locations in McMurdo Sound.
- **Mt. Terror** (FP Ops): Repeater is located on Mt. Terror and provides good coverage for Cape Crozier and areas south of Ross Island.

- **Mt. Aurora** (FP Ops): Repeater is located at the top of Black Island and provides coverage for most sea-ice travelers, except for those behind the Erebus Ice Tongue or close to shore behind Hut Point.
- **Mt. Brooke** (FP Ops): Historically, the Mt. Brooke repeater has been located on Mt. Brooke in Allan Hills and used by the Odell Glacier camp or other camps in the area. In the future, this repeater may change names and/or locations.

McMurdo VHF Frequency Plans

- The **McMurdo Frequency Plan** is for science groups and station personnel working in and around the McMurdo Station area. The McMurdo plan is programmed in most vehicles.
- The **16-Channel Frequency Plan** is identical to the McMurdo plan, with four additional frequencies. It is programmed in all Pisten Bully and most Mattrack vehicles. This plan is distributed to most field personnel working on the sea ice and in the Dry Valleys.
- The **Field Party Frequency Plan** is available on hand-held radios for science groups and field-camp support personnel deployed to the Dry Valley region, sea-ice camps, and Ross Island camps.
- The **SAR Frequency Plan** is for parties involved in field safety training and search-and-rescue activities.

Table 6: McMurdo Frequency Plan

Channel	Plan Title	Transmit	Receive
1	I-Net	143.000	143.000
2	Fire	139.600	139.600
3	Mac Ops	139.000	142.600
4	Science	139.500	139.500
5	MCC/Fleet Ops	139.800	143.725
6	Airfield/Tower	139.200	139.200
7	Helo Ops	143.400	143.400
8	Utility	143.200	143.200
9	Fuels	143.600	143.600
10	Mt Terror (Ross Island)	138.600	143.225
11	Mt Aurora (Black Island)	138.600	143.225
12	Wright Valley (Mt Newall)	138.600	143.225

Table 7: 16-Channel Frequency Plan

Channel	Plan Title	Transmit	Receive
1	I-Net	143.000	143.000
2	Fire	139.600	139.600
3	Mac Ops	139.000	142.600
4	Science	139.500	139.500
5	MCC/Fleet Ops	139.800	143.725
6	Airfield/Tower	139.200	139.200
7	Helo Ops	143.400	143.400
8	Utility	143.200	143.200
9	Fuels	143.600	143.600
10	Mt Terror (Ross Island)	138.600	143.225
11	Mt Aurora (Black Island)	138.600	143.225
12	Wright Valley (Mt Newall)	138.600	143.225
13	Taylor Valley (Mt Coates)	138.600	143.225
14	Mt Brooke	138.600	143.225
15	Helo Flight Following (FF) (Rcv Only)	138.500	143.975
16	Marine Channel 16	156.800	156.800

Table 8: Field Party Frequency Plan

Channel	Plan Title	Transmit	Receive
1	I-Net	143.000	143.000
2	Fire	139.600	139.600
3	Mac Ops	139.000	142.600
4	Science	139.500	139.500
5	MCC/Fleet Ops	139.800	143.725
6	Helo FF (Rcv Only)	138.500	143.975
7	Helo Ops	143.400	143.400
8	Taylor Valley (Mt Coates)	138.600	143.225
9	Mt Brooke	138.600	143.225
10	Mt Terror (Ross Island)	138.600	143.225
11	Mt Aurora (Black Island)	138.600	143.225
12	Wright Valley (Mt Newall)	138.600	143.225

Table 9: SAR Frequency Plan

Channel	Plan Title	Transmit	Receive
1	I-Net	143.000	143.000
2	Fire	139.600	139.600
3	Mac Ops	139.000	142.600
4	NZ Crater Hill	139.300	143.800
5	MCC/Fleet Ops	139.800	143.725
6	Helo FF-Cones (Tx/Rx)	138.500	143.975
7	Helo Ops	143.400	143.400
8	Taylor Valley (Mt Coates)	138.600	143.225
9	Mt Brooke	138.600	143.225
10	Mt Terror (Ross Island)	138.600	143.225
11	Mt Aurora (Black Island)	138.600	143.225
12	Wright Valley (Mt Newall)	138.600	143.225

Mac Ops VHF Monitoring Requirements

The Zetron console is used for VHF communications in and around McMurdo Station. The Zetron is capable of monitoring the frequencies used for Regional Travel Checkouts, Field Camp communications, Aircraft Movement Reports, and other community communications. The Zetron can monitor and transmit on 12 separate frequencies. Mac Ops is required to monitor the following frequencies:

- VHF 1 – I-Net
- VHF 2 – Fire
- VHF 3 – Mac Ops
- FP1 – Taylor Valley
- FP2 – Wright Valley
- FP3 – Mt Terror
- FP4 – Mt Aurora
- FP5 – Mt Brooke

The operator may monitor other channels at his or her discretion. Mac Ops uses three Motorola base station radios separate from, and as a backup to, the Zetron console. The base stations provide a wider range for frequencies. However, Mac Ops is unable to patch and simul-select channels on the Motorola units.

Zetron VHF Dispatch Console Operations

1. Select the green <Select Call> button under the broadcast channel. A green light indicates the selected frequency.
2. Key the microphone by pressing the large, white button on the base of the microphone, and speak. Release the button when finished speaking.
3. The radio traffic on that channel is heard through the Select speaker in the lower left portion of the console.
4. All other radio traffic monitored is heard from the Unselect speaker on the lower right portion of the console.
5. Volume for both speakers is adjusted using the knobs underneath the speakers.

Other Features

To simulcast on the Zetron:

1. To broadcast on more than one channel (for example, for weather announcements and SAR operations), press and hold the green <Simul-Select> button (on the control panel under the LED display) while selecting multiple channels. Green lights indicate the selected channels. Release <Simul-Select> button before transmission; selected channels should remain illuminated.
2. Key the microphone by pressing the large, white button on the base of the microphone, pause for 2 to 3 seconds, and begin speaking. It is important to pause to allow the repeaters to key up. Release the button when finished speaking.
3. When transmission is complete, re-select the original channel to cancel the simulcast. All green indicator lights for the other channels should go out.

To adjust volume of individual channels:

Select and hold the yellow <Vol-Adjust> button under the intended channel. Turn the Channel Volume knob (on the lower, right portion of the panel below the unselect speaker) to reach the intended volume.

VHF Phone Patch

A phone patch provides telephone communications to field camps and personnel in the Ross Island or Dry Valley areas with access to VHF radio frequencies.

The operator enables VHF phone patches between VHF radio frequencies and the telephone using the Zetron panel. Anyone with access to a telephone can communicate with field camps and personnel in the Ross Island or Dry Valley areas having access to VHF radio channels.

VHF Phone Patch Instruction

Use the following steps to enable a VHF phone patch:

1. Remove the handset from the cradle. It's also possible to use the microphone to talk to the phone party.

2. Press the green <Answ/Hld> button on the Phone column of Zetron panel. Listen for a dial tone.

3. Enter the desired phone extension using the keypad. The number automatically dials.

Note If an incorrect number is entered, press the red <Xmit Busy> button to clear the entry and begin again.

4. Listen through the select speaker to hear the phone party answer. To respond, speak into the desktop microphone (but do not key to transmit). To avoid feedback, move the microphone away from the speaker.

5. When the telephone party is on the line, relate the following guidelines:
   - Conclude each transmission with "Over."
   - Wait two to three seconds after the other part says "Over" before beginning transmission.
   - Loud background noise and breathing into the phone receiver can key the microphone and interfere with the other party's transmission.
   - Once connected, the telephone party initiates the conversation by calling the station name twice and providing identification. For example, "B009, B009, Helo Ops."
   - When finished with the conversation, hang up the phone.

6. Inform the telephone party that he or she will be connected to the remote party now.

7. Push the blue <Patch> button on the phone column and the desired frequency column. The phone party is now connected.

Note With one exception, it's possible to monitor and transmit as normal on another channel while the phone patch is in progress. However, if the phone patch uses one of the Field Party Ops repeaters, the other Field Party Ops repeaters are not available. Attempting to transmit on a Field Party Ops frequency while a phone patch is in progress with another Field Party Ops repeater will disrupt the patch.

8. When the telephone user hangs up, a busy signal is audible in the speaker. Terminate the patch by pushing the red <Xmit Busy> button in the phone column and the blue <Patch> buttons.

VHF-to-HF Radio Phone Patch

As described in the previous section, the operator provides HF or VHF radio patches between radio channels and telephone users. The same patching function is also used to connect VHF radio users with HF radio users.

The VHF-to-HF phone patch uses an integrated phone line on the Zetron panel (VHF) and the JPS Radio telephone Interface (HF).

VHF-to-HF Radio Phone Patch Instruction

Use the following steps to enable a VHF-to-HF radio phone patch:

1. Upon receiving a request for a patch via VHF radio, establish communications with the field party or camp via HF radio.
2. Set the Zetron VHF radio console as follows:
    - On the phone column of the Zetron panel (far, right side), press the green <Answ/Hold> button. Listen for the tone.
    - On the HF console, note the telephone line that corresponds to the target Mac Ops group.

      Mac Ops group 1 – extension 2908

      Mac Ops group 2 – extension 2912

      Mac Ops group 3 – extension 2907
    - On the Zetron panel, input the VCCR phone extension using the keypad. The number automatically dials.

Note To remove an incorrectly entered number, press the red <Xmit Busy> button to clear the entry and begin again.

3. The telephone at the HF console rings. Select the proper incoming line to answer, pick up the receiver and set it aside.
4. Set up the HF console for a patch:
    - On the Mac Ops group used for the patch, select the HF frequency for the field party.
    - Verify the squelch is "Off" on the selected group.
5. On the Zetron VHF panel, press the blue PATCH buttons under the Phone column and the column of the VHF channel where the party is standing by.
6. Advise the party on HF radio the patch is active. Briefly outline phone patch protocol and request the HF party initiate the transmission.
7. From the HF console RTU-200 component for the desired channel, switch the Telephone Line toggle switch to the Connect position to enable the patch.
8. Hang up the telephone line by touching the touch screen phone icon to prevent feedback.

Note Transmitting on the patched frequency with the HF handset may interrupt the patch.

Patch Disconnect

A telephone busy signal is audible once the call is finished and the phone party hangs up. Follow these steps to disconnect the patch:

1. From the HF radio console: at the RTU-200 component, set the Connect/Disconnect switch to Disconnect.
2. From the Zetron VHF dispatch panel, press both blue PATCH buttons. Press the red <Xmit Busy> button. Select any VHF channel to monitor. This action extinguishes the green light on the Ring Select button for the Phone column.

Note Use the same patching procedure when patching from HF radio to a VHF station.

TEAC Communication Recorders

This section details the operation of the TEAC Communications Recorders, including search modes, recording, exchanging disks, and equipment maintenance.

The operator records radio frequencies daily and utilizes recorders to search for recorded information as needed.

Discussion

Mac Ops uses two TEAC CR-500 Communication Recorders to record VHF and HF channels during 24-hour operations. One unit continuously records communications. A second unit is available in the event of equipment malfunction or failure. Each TEAC recorder features dual drives for backup and continuous recording capability. The operator can search current or archived disks to replay a past recording on any HF or VHF frequency monitored by Mac Ops, excluding the Motorola VHF portable radios. The operator changes recording disks as scheduled.

Recording Mode

The TEAC CR-500 allows five recording modes. Mac Ops utilizes the Dual 2 recording mode to ensure a backup of all recorded material.

Change TEAC Media Disks

Each disk allows for 1200 channel hours of radio recording time. The record period for any disk varies, however, depending largely on the amount of radio traffic on the monitored frequencies.

The operator changes the Memory Optical Drive (MO) disk in the main drive each night at midnight. The length of time any disk will record varies depending on the amount of radio traffic on the monitored frequencies.

After the main drive disk is changed, the sub-drive disk commences re-recording from the start. Each disk is capable of recording on both sides. To record on the opposite side of the disk, the operator must eject the disk and turn it over. While exchanging disks, the hard disk buffer allows recording to continue uninterrupted.

To exchange a disk:

1. Press the PANEL LOCK key and type the Master Password when prompted.

Note The password is available from a Mac Ops supervisor.

2. Select Media by selecting F1.
3. Select EXCH by selecting F1.
4. When prompted with: `Media Change OK?` press ENT. The TEAC takes several seconds to close the recording, then displays the drives available for exchange.
5. To change the corresponding drive, select F3 under A.
6. When prompted with: `Eject OK?` press ENT. The media stops recording and ejects from the drive.

CAUTION DO NOT use the button located on the drive, as this erases all recorded information on the disk!

7. Verify the ejected disk is properly labeled with the record date on the correct side.

Note For labeling purposes, the side that faces up while recording is the correct side for the label.

8. If the removed disk was not recorded on the other side during the previous day, turn the disk over, label it with the correct record date, and reinsert the disk into the main drive. Otherwise, pick a disk from the left side of the shelf, label the record date, and insert the disk into the drive. Insert side A first, and flip to side B before changing to a new disk.
9. If inserting a new (unused) disk, the recorder prompts: `Format OK?` Press ENT.
10. If inserting a re-used disk, the recorder prompts: `Overwrite OK?` Press ENT.
11. Press the PANEL LOCK key when finished.
12. Re-shelve the removed disk in rotational order on the right side of the shelf.

Search a Disk for Recorded Information

The TEAC CR-500 enables the operator to find specific recorded data on any of the monitored frequencies. Frequencies are recorded by a 1GB hard disk buffer, then automatically uploaded every ten minutes and recorded onto the media. This allows for recording communications while replacing the media or monitoring a playback, without a lapse of information. The hard disk buffer is capable of storing 150 channel hours of recorded calls. The calls can be played back directly without accessing the media and interrupting recording. There are two methods to access recorded information, either directly from the TEAC recorder or through the computer software.

To search for recent transmission using the TEAC recorder

The most recent transmission on a given channel can be quickly replayed directly through the TEAC recorder.

1. Press the PANEL LOCK button and type the Master Password as prompted.
2. Press F2 under Recall to enter Recall mode
3. Enter channel number in Recall Ch field.

4. Press enter. It is possible to manipulate the recorded playback using the function keys of the Playback control group.

To search for other recorded information using the TEAC recorder

1. Press the PANEL LOCK button and type the Master Password as prompted.

Note The password is available from a Mac Ops supervisor.

2. Press F2 under Recall to enter the recall mode.
3. A screen appears with the following prompts:
    - Recall CH
    - Dial Search
    - Time
4. Enter the channel(s) to playback as a two-digit number (for example, 02) and press the TAB button twice to move to the Time field. (For more information, reference the channel list posted adjacent to the TEAC.)

Note The TEAC CR-500 will locate the call that is closest to the time entered. It is important to select a time that falls before the call, as the TEAC will not search before the specified time and cannot locate the information if it occurs outside the search parameters.

5. Use the up/down arrow buttons to scroll through the Months, and the number keys to enter date and time of the information to search. The format for the LED screen is as follows: Month/Day/Two-digit year and Hour/Minute/Seconds.
6. Press ENT for playback to begin. It's possible to manipulate the recorded playback utilizing the function keys of the Playback Control Group located below the disk drives.

Note Directions for the function keys of the Playback Control Group are detailed on a quick-reference card posted at the TEAC recorders. A description of the functions is also found in the *CR-500 Communication Recorder Operation Manual* located on the reference shelves in Mac Ops.

7. To search for a different call, press the PREV button, and repeat Steps 3 through 6.
8. To exit the Play Recall mode, press STOP in the playback control group, then MENU.
9. When finished, press the PANEL LOCK button.

To search for recorded information using the CR-500 PC Remote software

1. Select the TEAC icon on the desktop.
2. Enter the username and password.

Note The username and password are case sensitive and are available from a Mac Ops supervisor.

3. At System Settings Screen, select Accept. The screen opens to a window displaying the Playback tab.
4. Three choices are listed in the Play Mode box, located in the center, right of the screen.
    - Call List: This function is used to playback specific calls from a call list after they are loaded into the call library from the MO disk.
    - Station: This function is used to playback all the calls recorded on an individual channel.
    - Recall: This function is used to immediately playback calls from the on-line CR-500 hard drive buffer.

The TEAC software supports these functions. For the purposes of Mac Ops, the Recall function is used for most call searches.

1. Select the Recall function from the Play Mode box.
2. Select Seg Continuous from the drop-down menu below the Play Mode Box.
3. In top, center of the screen, in the Search box select the Date/Time button. The Get Date/Time window appears.
4. Select the appropriate date by clicking the day to search on the calendar. If the time is known, select the appropriate time by using the arrow buttons, or by moving the hand of the dial with the mouse. If the exact time is not known, select a time close to, but preceding, the beginning of the call.
5. Select OK.
6. Select the channel(s) to playback by clicking the channel button. It's possible to select up to four channels.
7. In the Playback box located in the lower, left of the screen, click the Play button twice to begin playback.
8. Use the function buttons in the Playback box to manipulate the playing of the recorded call.

To change the configuration and setup of the TEAC CR-500 software, log in using the supervisor username and password supplied by TEAC at time of purchase and installation. The username and password are found in the *TEAC Remote Workstation Software Manual* in the Mac Ops reference library.

The TEAC Channel List is included below. It's also posted adjacent to the TEAC recorders on the console.

Table 10: TEAC Channel List

Channel No.	Channel Name
1	HF – MO 1 – Work
2	HF – MO 1 – Guard
3	HF – MO 2 – Work

4	HF – MO 2 – Guard
5	HF – MO 3 – Work
6	HF – MO 3 – Guard
7	HF – MO 4 – Work
8	HF – MO 4 – Guard
9	HF – MO 5 – Work
10	HF – MO 5 – Guard
11	VHF - I-Net
12	VHF - Fire
13	VHF - Fuels
14	VHF – MCC/Fleet Ops
15	VHF - Mac Ops
16	VHF - Helo Ops
17	VHF - Field Party Ops
18	VHF - Helo Flight Following
19	VHF - Iridium base station
20	(blank channel)
21	Phone ext. 2586
22	Phone ext. 2908
23	Phone ext. 2912
24	Phone ext. 2907

Recorder Maintenance

It is important to clean the air filter every two weeks. The filter is found in the top of the unit. Use water to clean the filter. Dry it thoroughly before replacing. The Mac Ops supervisor sets a cleaning schedule.

Field Party Tracking and Support

Pre-Field Communications Brief

The Mac Ops supervisor briefs grantees and field camp managers regarding communications procedures, protocol, and useful frequencies while in the field.

Briefing Sessions

- **In-Brief** – The NSF Representative conducts a science in-brief at the Chalet for each science group upon arrival at McMurdo Station. If the science group is allocated communications equipment, the Mac Ops supervisor attends the meeting.

- **Communications Brief** – After the In-Brief (above) and before receiving communications equipment from the Communications Shop, at least one member of each science group must attend a separate communications brief with the Mac Ops supervisor. The supervisor advises the field group of the proper communications procedures and protocol and appropriate frequencies to use while in the field. The supervisor completes the Mac Ops Communications Briefing form with important details of the party's field plans and relays that information to Mac Ops via the *Mac Notes*. The completed Mac Ops Communications Briefing form resides in the "Science In-Brief" binder at the operator's console.

Mac Ops Communications Briefing Form

During the brief, the Mac Ops supervisor completes the Mac Ops Communications Briefing form. A short description of required information follows.

Event

- Science parties are generally identified by the related science event number and principle investigator (PI) name [for example, "AB-123(Smith)"], whether or not the PI has deployed.
- RPSC-staffed field camps are generally identified by the name of the camp location.
- Establish the field party call sign at this time to avoid confusion later.
- Explain the McMurdo-based call signs Mac Ops, Mac Center, and Mac Weather.

Field Team Leader(s)

- This individual is in charge of the group in the field (not necessarily the principal investigator).
- Note any anticipated changes in field-team leadership during the season.

Field Team Members

- List the names of all members of the group.
- Note any late arrivals or early departures of the field team members.

Daily Check-in Time

- Assign a daily check-in time to groups that will remain overnight in the field.

Note There is additional opportunity to discuss daily check-in during the brief when reviewing the Communication Guidelines handouts.

Estimated Put-in/Pull-out

- "Put-in" – Estimated date the group will enter the field.
- "Pull-out" – Estimated date the group will leave the field.

Primary Locations

- List the primary locations the group will work by name and/or coordinates.
- If possible, list the amount of time planned for each location.

Radio Equipment Allocation

- Determine if the group is allocated HF radios and/or VHF radios. Record the radio equipment on the form (PRC 1099, RT 100, VHF handheld radios, VHF Air-to-Ground radio).

Other Communications

- Determine if the group will carry additional communications equipment in the field.
- If the party will have a radio telephone, record the location and number.
- Determine if the group will have an Iridium phone and, if so, how many? If the group brings its own Iridium phone(s), note the phone number(s) of the unit(s). Review the basics of Iridium operation, including how to call McMurdo Station and retrieve text messages.
- If the group will be taking multiple Iridium phones, determine which phone will be used as a primary phone for receiving calls and text messages from Mac Ops.

Dive Support

- Determine if the group will perform any diving. If so, record the locations.
- Record any related support that may be necessary for the group (reference Dive Accident Management Plan).

Transportation Support

- Determine the mode of travel/support for the group. (This includes travel via Twin Otter, LC-130, helicopter, snowmobile and tracked vehicles.)

Note Some groups may utilize several types of transport to the field sites.

Special Notes

- Record the details of the group's field season under the Special Notes section of the Mac Ops Communications Briefing form. This includes specifics of travel plans, communications information, logistics, and other issues of interest and relevance.
- Once the Mac Ops Communications Briefing form is complete, file the form in the Science In-Brief binder. Summarize the information and record in the *Mac Notes* for operator reference.

Communication Guidelines Handouts

The handouts listed below summarize additional information for the field parties and are distributed and reviewed as applicable.

A brief description of information to supplement the handout also follows.

Information Sheets

- Communication Guidelines for Field Camps – Appropriate for those field parties remaining at a site for over 24 hours, whether supported by vehicle, helicopter, or fixed-wing aircraft.
- Communication Guidelines for Regional Travel (off established roadways) – Appropriate for field parties traveling in the local McMurdo Station area by tracked vehicle and returning on the same day.
- Solo Vehicle Travel Guidelines – In addition to the handouts above, this additional information is appropriate for solo (one person) travel locally by tracked vehicle. It is important to emphasize that individuals interested in solo travel must seek prior approval by the NSF Representative.

Arrival at Field Location

Upon arrival at an unoccupied field location, the field-party leader will immediately establish communications with Mac Ops. This check-in is an essential step in verifying the party has reliable communications. It also serves to alert Mac Ops to begin tracking the party.

Note the following:

- Radio relay via the aircraft does not verify a reliable communications link to McMurdo Station.
- Radio, radio telephone, or satellite phone (Iridium) are acceptable methods of communication.

Upon establishing successful communications, the field-party leader will provide Mac Ops with the location, event number, number of party members, and confirm a daily check-in schedule.

Daily Check-In Time

- Verify the party understands the purpose of the daily check-in time is to confirm the health and safety of a camp on a daily basis. The check-in process also provides a predictable time when messages are passed to the camp by Mac Ops.
- Encourage early check-ins, provided the check-in is no earlier than 5 hours prior to the regularly scheduled check-in time.
- Discourage check-ins later than the scheduled check-in time. Emphasize that NSF safety guidelines allow camps a one-hour grace period during which attempts will be made to

contact the camp. If no contact is made after one hour, the Search and Rescue procedures are initiated.

- A field party may change the daily check-in time, as long as the change is clearly communicated to the operator on duty.

Return from Field Location

The field party will notify Mac Ops upon leaving a camp unoccupied. This alerts Mac Ops to remove the party from the status board, clearing any further check-in requirement.

Radio equipment must be returned to the Field Party Communications Shop at Building 159.

Day Parties

The following requirements apply to those aircraft-supported field parties that remain at a site for less than 24 hours without an aircraft remaining on site.

The field party must perform a radio check with the aircraft before its departure, verifying reliable two-way communications.

An optional radio check with Mac Ops will verify a communications link is established to McMurdo Station. This is useful if the party opts to reschedule a pick-up time. It is also important in the event the aircraft cannot return that day and the field party must remain at the site overnight.

Field Communications

Verify the field party understands how to reach Mac Ops using one or more of the following methods, dependent on the appropriate equipment. The Communication Guidelines handouts provide detailed information for field party reference.

- Radio Telephone – Operates similar to a conventional telephone, but utilizes Ultra-High Frequency (UHF) signals. The handouts list extension numbers for Mac Ops.
- Iridium Satellite Communications – The Field Party Communications Shop provides field parties with a detailed briefing concerning Iridium operation. The handouts list the Iridium and USES phone numbers for Mac Ops.
- HF/VHF Radio Communications - Explain the following information, as needed.
  - — General Radio Use – Offer a brief explanation of radio protocol if such standards are unfamiliar to the field group. For example:
    - Wait for a clear frequency to initiate a call.
    - Call the desired station twice, then provide identification using the call sign and frequency.
    - "Stand by" signals to wait until Mac Ops returns the call.
    - "Go ahead" indicates to proceed with the transmission.

— HF Radio Communications – Provide a general overview of how HF radio signals travel and how solar activity affects communications. Mac Ops, Scott Base, and Mac Center frequencies are listed on the handout. The Field Party Communications Shop will demonstrate setup and use of all radios.

— VHF Radio Communications

- McMurdo Station uses four different frequency plans, and all VHF radios are labeled with the frequency plan.
- All VHF uses "line-of-sight" and repeaters extend the range.
- Explain VHF repeater locations and coverage.
- Review the VHF frequencies and related field parties.
- Advise the field party of the best frequencies based on field location(s).
- Remind the party that it should attempt to contact other field parties for a relay back to Mac Ops if unsuccessful in contacting Mac Ops directly.

Regional Travel

Personnel who work or travel outside McMurdo Station are required to follow safe travel and communications guidelines. Science event and contract personnel whose work requires sea ice or Ross Island-area travel attend a communications brief with the Mac Ops Coordinator before commencing travel.

Note The Regional Travel Guidelines are defined by the National Science Foundation. Mac Ops provides operational support of such guidelines.

BITF Traverse Support

For detailed information and requirements regarding the support of Black Island Telecommunications Facility traverse activities, reference procedure *QSP: BITF Traverse* (IT-M-0354).

Regional Vehicle Travel (off established roadways)

Established roadways for the austral summer include: the ice road to the Ice Runway, the snow roads to Williams Field and Pegasus Runway, and the dirt road between McMurdo and Scott Base, McMurdo Transmitter Facility (T-Site), and Arrival Heights.

No solo travel is allowed, unless authorized by the NSF Representative. For more information, reference the Solo Travel section below.

Travel off established roadways (by vehicle or foot) requires a check-out with Mac Ops.

General Requirements

A check-out by radio (rather than telephone) is required to ensure that radios are operational.

A check-in upon return is necessary to avoid initiation of Search and Rescue procedures.

Weather Conditions

The party leader is responsible for remaining informed of weather conditions. Mac Weather is available directly on I-Net, or by phone patch via Mac Ops.

- Weather Condition 3: Two or more individuals traveling together is allowed.
- Weather Condition 2: Snowmobile travel is NOT authorized. Travel in covered vehicles may proceed with caution upon receiving current and forecasted weather information.
- Weather Condition 1: No travel of any kind is authorized.

Radio Requirements

Snowmobiles and foot parties must carry a hand-held VHF radio and spare battery.

A VHF radio is installed in each covered vehicle. It is advisable to also carry a hand-held VHF radio and spare battery as backup.

Note McMurdo Station uses several VHF frequency plans. Travelers are advised to contact the Field Party Communications Shop to verify frequency plan and repeater information.

Solo Travel

Individuals are not allowed to travel alone in vehicles on routes other than established roadways without direct authorization from the NSF Representative. Such permission is granted on a case-by-case basis. Solo travel is authorized only for travel on secondary flagged routes, such as those to fish huts, dive holes, Castle Rock, Cape Evans, and local sea-ice and sea-shelf camps. Solo overnight stays are prohibited.

Note The USAP policy regarding solo travel is the jurisdiction of the National Science Foundation. Any modifications to the process must originate with the NSF.

Mac Ops provides the following instruction to those field parties that receive the required NSF permission for solo travel.

Communication

1. The party must carry a radio (either an installed vehicle-radio or a handheld radio with spare battery).
2. The party must radio Mac Ops from point of origin for initial check-out to ensure the radio is operational. The radio check-out for solo travel includes ETA at destination.
3. Upon arriving at the destination, the party must contact Mac Ops.
4. Prior to departure for return, the party must check-out once again with Mac Ops, including ETA back to point of origin.
5. The party must complete a final check-in with Mac Ops upon arriving back at point of origin.

Survival Equipment

The party must carry the following equipment during solo travel:

- Survival bag
- Thermos of hot liquid and a water bottle
- ECW gear
- Emergency food/high energy snacks

Weather

Solo travel is conducted only in Weather Condition 3.

Overnight Travel

If planning an overnight stay, the party must provide the following information, in addition to the standard check-out procedure information in the section below.

- Estimated time of arrival at the overnight site
- Estimated time of return the following day
- Morning check-in time

This information is provided to Mac Ops via telephone or in person prior to the party's departure.

Check-out Procedure

Mac Ops will instruct travelers to use the following check-out procedure.

1. The party initiates contact with Mac Ops using the VHF radio and by calling "Mac Ops, Mac Ops, this is (*vehicle number or call sign*)." Mac Ops will acknowledge the transmission and the party continues by providing the following:
   - Vehicle number(s)
   - Event number (or department)
   - Destination
   - Number of individuals in the party
   - ETR back to point of origin (or ETA at destination, if traveling one-way)
   - Driver's surname
   - Name and contact information for Point of Contact (POC) at McMurdo Station – someone who is familiar with the details of the party's travel.
2. The party must notify Mac Ops if the travel plans change – to revise destination, ETR, or ETD.

3. Upon arrival at point of origin or destination, the party is required to contact Mac Ops.

Note It is important to emphasize the requirement of a timely check-in. If the party neglects to check-in according to the travel plan, Mac Ops is required to follow Search and Rescue procedures. (For more information, reference the Safety and Emergency Procedures chapter of this guide, section Search and Rescue and Emergency Response.

Vehicle Travel on Established Roadways

Vehicles traveling in town and to/from the airfields are not required to check-out during Weather Condition 3.

During Weather Condition 2, vehicles traveling on established roadways are required to check-out and check-in with the Firehouse.

Documentation of Events

The various documents described in the Documentation and Record Management chapter of this manual provide a series of checks and balances and some intended redundancy for tracking critical information. This section describes which documents should be used for different events.

The type of document to use is largely based on the type of information needed – and its ultimate use. For example, the *Mac Log* provides a chronological record of events listed by time – useful for recording important routine and non-routine information in an efficient, abbreviated format. The *Mac Notes* provide a more open format for more detailed, easy-to-read information for all operators to review.

Detail on each level of documentation and its requirements and management is found in the Documentation and Record Management chapter of this guide.

In addition to the documents listed in the Documentation and Record Management chapter, Mac Ops also utilizes a plasma screen to display the current *Daily Field Camp Report* and additional information such as confirmed communications (Iridium or specific frequencies), special Sunday check-in time, and current GPS coordinates.

Documentation Requirements

Documentation requirements for specific events are summarized in Table 11 and are further described in the sections that follow.

			Regional Travel Log	MacLog	MacNotes	Daily Camp Report	Field Party Status Board	SARMC Log	**Mac Log Entry** Description and Examples
	ON	***Ops Normal; Routine***		X					Routine entries such as all ops normal, radio checks, TEAC change, shift change, etc.
	DC	***Daily Camp Check-In***		X		X	X		(**camp name**) daily check-in (dci), (**freq/phone**) (**comms qual if not l/c**), (**#**) POB Example: *SDM dci, 7995 m/r, 5 pob*
	RT	***Regional Travel*** ***checkout, checkin, revision***	X	X					(**vehicle/group**) dep (**origin**) for (**destination**), (**channel**), (**#**) POB, (**ETA/ETR**) (**time**) Example: *2sno/B009 dep mcm for bri, fp2, 3 POB, etr 1300. At 1241.ab rev etr 1500.* (in ATR/ATA column of original checkout entry): *1443.cd* (to show return/arrival with initials)
	WX	***Weather Condition***		X					Example: *Cond 2 willy field and willy rd; all other areas Cond 3*
	FF	***Flight Information***		X					(For Winfly or Winter operations only)
Summary Report	**CC**	***Camp Change*** ***put-in, pull-out, move, change in occupancy***		X		X	X		(**camp name**) (**put-in/move/change**), (**freq/phone**) (**comms qual if not l/c**), (**#**) POB, dci (**time**) Example: *SDM put-in, iridium, 3 pob, dci 0800* Example: *BRI unoccupied per helo ops* Example: *LKF put-in, 4770 w/r, 3 pob, dci 2000* Example: *BRI reoccupied, fp2, 3 pob, dci 2000* Example: *SDM pullout via herc* Example: *B123 camp move to Moody GI; dci still 0900*
	EH	***Equipment - HF***		X	*				Example: *No transmit on MacOps 1 Group 2; ATS tech paged* {include problem, equipment, action taken; extensive detail may be included in MacNotes}
	EV	***Equipment - VHF***		X	*				Example: *Cp Royds Comms on FP3 broken; sounds like rptr battery low; informed Coordinator*
	EI	***Equipment - Iridium***		X	*				Example: *iridium was unable to receive calls; reset it on docking station; okay now*
	EO	***Equipment - Other***		X	*				Example: *Phone comms on all lines sounded crackly; FP shop replaced handset cord; L/C now*
	SR	***SARMC Notification*** ***or other SAR or emergency***		X				X	Example: *Paged SARMC for 310 overdue check in* {Use for SAR-related (or potential pre-SAR) incidents and updates, except routine training/exercise}
	VC	***Vessel Comms*** ***initial vessel contact, position, non-routine comms***		X					Example: *Italian vessel "Italica" on 7995 m/c, called to say hello, currently near cp adare* Example: *Polar Sea via 8418 L/garbled, reports position S 68d 40m, E 175d 22m*
	MM	***Miscellaneous***		X	*				Use for other undefined, non-routine entries that should be brought to another operator's attention. For example, significant HF propagation changes, non-routine comms, nga comms, unusual events

* Additional information may be included in MacNotes

Table 11: Documentation Requirements

Shift Changes, Routine Radio Checks, and other routine events

Routine entries listed in the *Mac Log* with "ON" as entry type, should be of a routine nature, not requiring review by other operators. These entries are not flagged in the *Mac Log* Summary Report (described in Documentation and Record Management chapter of this manual).

Daily Field Camp Check-In

All parties remaining in the field for 24 hours or longer are required to check in with Mac Ops at least once per day. This daily communication allows Mac Ops to monitor the status of the camp, communicate messages, and alert station personnel if problems or safety concerns arise.

- When a field camp calls with the daily check-in, record on the draft (hard copy) *Daily Field Camp Report* the camp name, actual check-in time, POB, number of personnel by event number, communications type, and communications quality (if other than loud/clear). (Communications type and quality is not transcribed to the electronic *Daily Field Camp Report*, but is written on the hard copy for reference when transcribing information to the *Mac Log*.)
- If the camp is a Regional/Vehicle supported camp, record the names of each individual present at the camp at the time of check-in in the *Vehicle Supported Camp Muster* electronic document.
- Before signing off, check the *Message/Conference Request Log* for any messages.
- Transcribe check-in information to the electronic *Daily Field Camp Report* to prepare it for the next e-mail.
- Transcribe information to the *Mac Log.*

Regional Travel Check-Out

When a field party departs McMurdo Station by vehicle off established roads, the party is required to check-out by radio with Mac Ops. The operator documents the following:

- Record initial check-out information on the *McMurdo Regional Travel Check-Outs Log.* Check for any empty fields before signing off to verify that all required information is received.
- Transcribe the information from the handwritten log to the *Mac Log*. This serves as an electronic searchable record of chronological events and also provides a means for the operator to monitor estimated check-in times.

McMurdo Regional Travel Check-In (or update to ETA, ETR or destination)

When a field party checks back in with Mac Ops, (or calls with a revised ETA or ETR), the operator documents the following:

- Enter the actual check-in time (or the revised ETA or ETR and time of call) on the hand-written *McMurdo Regional Travel Check-Outs Log*.
- Transcribe information to the *Mac Log*.

Field Camp Put-In or Camp Move

Upon arrival at an unoccupied field location, the field party leader will immediately establish communications with Mac Ops before the aircraft departs the field location. This check-in is an essential step in verifying the party has reliable communications. It also serves to alert Mac Ops to begin tracking the party. If a camp put-in or move requires more than one aircraft, the call should be made when the first aircraft arrives.

- When party calls with a camp put-in or move, record time of call, communications type and quality, POB (by event number), and daily check-in time (which should always be reconfirmed if already established). Enter this information in the *Mac Log*.
- Update the *Daily Field Camp Report* with the addition or change.

Field Camp Pull-Out

Any field camp pull-outs listed on the daily flight schedules are verified by the operator and are never assumed to happen as written. Instead, the operator must verify the flight information (with Mac Center, Helo Ops, Air Ops, aircraft, or directly with team members), before removing the party from the tracking system.

Regional field camps pulling out by vehicle are confirmed pulled out when they check-in with Mac Ops. Field camps pulled out by aircraft are assumed pulled out when the aircraft departs the camp (or anytime thereafter when the operator is able to confirm). Fixed-Wing aircraft are usually confirmed with an announcement from Mac Center. Helo pull-outs are often confirmed with Helo Ops before the end of their work day.

- Enter information in the *Mac Log*
- Remove the camp from the *Daily Field Camp Report* electronic and hardcopy documents.

Field Camp change in occupancy

An established field camp at times may become temporarily unoccupied. If a party leaves a field camp unoccupied (overnight or longer, such that a daily check-in is missed), it should be documented similar to camp put-in or pull-out:

- Enter information in the *Mac Log*
- Add or remove the camp from the *Daily Field Camp Report* electronic and hardcopy documents.

Weather Condition Change

When Mac Weather announces a Weather Condition change via VHF radio:

- In the *Mac Log*, indicate weather condition (1,2, or 3) and locations affected.

SARMC Notification

- Any time the SARMC (or designee) is paged, or given updated information on an event in progress, record the information and time in the *Mac Log*. Also record any other actions or information related to the event.
- Alert the Mac Ops Coordinator of any significant events and/or enter in the *Mac Notes*.

Vessel Check-In

- Enter initial or non-routine contacts, position reports, scheduled check-ins, or other significant or unusual communications in the *Mac Log*. There is no need to record routine phone patches or other routine requests.
- Consider elaborating on any of the above in the *Mac Notes*.

HF Propagation Changes

- Record significant HF propagation degradation or improvement in the *Mac Log*. Include descriptions of the communications quality with field parties on specific frequencies, which might be helpful to other operators.
- A more detailed description of degraded communications due to a solar flare (or actions taken due to it) may be elaborated on in *Mac Notes*.

Equipment Issues

- In the *Mac Log*, detail anything related to communications equipment. Symptoms of equipment malfunctions and a brief description of actions taken should be included. Update status as needed. Also include any equipment maintenance such as VCCR upload or reboot.
- Consider elaborating on major or complicated changes in equipment status (repair, upgrade) in the *Mac Notes*.

Helicopter Flight Schedule

The Helicopter Operations supervisor publishes a daily *Helicopter Flight Schedule*, listing the flight schedule for the following day. The schedule arrives via e-mail to the Mac Ops account at or around 1800 hours.

Note The *Helicopter Flight Schedule* is also available on the McMurdo Station Intranet.

Mac Ops operators review the helicopter schedule for information regarding changes in camp status – for example, camp put-ins, pull-outs, and moves. Such information is key in tracking the movement of field personnel.

1. The night shift Mac Ops operator prints the schedule from e-mail and posts it at the console with the daily Fixed-Wing aircraft schedules.
2. The night shift operator also reviews the helicopter schedule for the next day, and highlights any of the following:
    - Camp put-ins
    - Camp moves
    - Camp pull-outs
    - Changes to camp status (occupied versus unoccupied)

Note Camp movements may or may not be noted as such on the helicopter schedule. Therefore, it is important to read the schedule carefully to detect any camp changes.

3. At the end of the night shift, the operator reviews the next day's *Helicopter Flight Schedule* with the day-shift operator, particularly noting the highlighted information as part of shift turnover.
4. The day shift operator reviews the helicopter schedule for the current day at the start of the shift. The operator checks for projected camp changes in preparation of receiving camp put-in calls, or verification of camp moves and changes.
5. Towards the end of the day shift, the Mac Ops operator verifies the completion of the projected camp changes.

Note Contact the Helicopter Operations Supervisor or Assistant Helicopter Operations Supervisor as needed to verify information.

6. With the day's helicopter missions complete, the operator files the helicopter flight schedule in the notebook labeled "Helos."

Fixed-Wing Aircraft Flight Tracking

This section explains how to track and record Fixed-Wing aircraft schedules and movements, then properly disseminate the information to field camps and stations.

The Mac Ops operator tracks aircraft schedules, schedule changes, and flight movements on a daily basis, then disseminates the information to field parties, camps, and other stations requesting the updates.

Discussion

The Air National Guard, in support of USAP continental and intercontinental operations, flies the LC-130 aircraft. Twin Otter and Basler aircraft are operated by Kenn Borek Air in support of Antarctic operations. The Fixed-Wing Operations Supervisor publishes a semi-

weekly *Air Operations Planning Board (AOPB) Planner* from the semi-weekly AOPB meeting. This schedule provides an overview of planned flight operations.

Tracking Fixed-Wing Missions

Night Shift Operator

The Fixed-Wing flight schedule for the next day is received in the Mac Ops e-mail account at or around 1800 hours.

1. The night shift operator transfers the flight schedule information to the *Daily Aircraft Events* worksheet, stored at the operator's console. The following information is transcribed onto the worksheet:

Note Use a pencil to transcribe the schedule to the worksheet.

- The aircraft call sign (For example, Skier 41 or KBG)
- Event number (LC-130 only)
- Line number (LC-130 only)
- Primary and backup mission destinations
- Estimated time of departure
- Mission description (For example, tanker, cargo, reconnaissance; put-in or pull-out; and the science event supported)

Note For LC-130 flights, the line number indicates the sequence of all LC-130 events. (For example, G051 is the 51st mission flown by Air National Guard.) The event number indicates the sequence of events to a particular destination. (For example, P030 is the 30th mission flown to South Pole Station.) Cargo and passenger information is directly related to event number.

2. The operator relays the flight schedule via HF radio to South Pole Station and any field camps or parties scheduled to receive a flight or requesting flight information.

Note Flight schedules are vital information to field camps and stations. It is essential, for planning purposes, that Mac Ops disseminate this information in a timely and accurate manner.

3. Once the day's aircraft missions are complete, the operator files the current *Daily Aircraft Events* worksheet in the notebook labeled "Fixed-Wing."

All Shifts

The operator records all mission changes, schedule revisions, and flight movements on the *Daily Aircraft Events* worksheet. Any flight delays, cancellations, or mission changes are essential information for stations and field camps expecting flights. Camp put-ins, pull-outs, double shuttles and refueling flights all necessitate personnel coordination around the clock in various locations. Mac Ops provides the radio link keeping such personnel informed.

Mission information and changes are also communicated to Mac Ops from the Fixed-Wing Operations Supervisor and Raven Ops Duty Officer.

When a fixed-wing aircraft departure from McMurdo Station (or any other location) to an occupied field camp is announced, it is imperative that the operator immediately relay that information to the field camp.

Note Raven Ops announces LC-130 flight schedule changes or updates over the I-Net. Air Ops communicates changes to Twin Otter schedules. Mac Center announces aircraft movement reports over the I-Net.

1. Mac Center announces flight movement reports over the I-Net. The announcement may include the following information, to be recorded by the operator on the Daily Aircraft Events worksheet:
    - Actual departure time of aircraft
    - Estimated arrival time of aircraft at destination
    - Actual arrival time of aircraft
    - Diversion to a different destination

Note When missions are changed or cancelled, do not erase the original information. Cross out the outdated information and note the appropriate changes.

2. Mac Center also maintains an aircraft movement website, available on the McMurdo Intranet.
3. Raven Ops announces LC-130 flight schedule changes or updates over the I-Net. Air Ops communicates changes to Twin Otter schedules. Changes are recorded by the Mac Ops operator on the Daily Aircraft Events worksheet. Announcements may include the following information:
    - Cancellations
    - Change in destination
    - Change to type of event or event number
    - Change to estimated time of departure
    - Change to tail number
4. At the end of the shift, the operator reviews the flight schedule and any changes, updates or pertinent flight information with the next shift operator.

Weather Information

Mac Ops assists field parties and camps requesting information regarding current and forecasted weather conditions. Mac Ops also supports field camps in passing weather information for flight operations.

Pass Weather Information

Field parties or camps that contact Mac Ops for current weather information or forecasts are connected to Mac Weather via a phone patch for direct exchange of information. Mac Ops uses the following methods to assist Mac Weather.

1. Use HF-radio phone patches to connect deep-field camps to Mac Weather.
2. Advise local area field parties utilizing VHF radios to call Mac Weather directly on the I-Net (VHF Channel 1) when weather information is requested.
3. Connect McMurdo region field parties to Weather via VHF radio phone patch if Channel 1 is unavailable due to the field party's location.
4. Mac Weather has an Iridium phone. Field camps with Iridium phones may contact Mac Weather directly during periods of degraded HF communications.

Note Mac Weather operates 24 hours per day, 7 days per week during the austral summer season, with the exception of holidays when staffing is reduced and the department operates on an "on call" status.

Field Camp Weather Reporting

Field camps scheduled to receive flights are required to begin passing weather observations according to a specific schedule. It is not the duty of Mac Ops to remind field camps of these requirements unless specifically requested to do so. At times, Mac Weather, Air Ops, or other personnel may request additional weather reporting.

1. Starting 12 hours before a scheduled flight to a field camp, the camp will pass weather observations to Mac Weather every three hours.
2. Starting six hours before a scheduled flight to a field camp, the camp will pass weather observations to Mac Weather every hour. For camps scheduled as an alternate destination, observations every three hours are required starting six hours prior to the scheduled flight.

Note These hourly weather observation calls also provide Mac Ops with a convenient schedule to pass messages, flight updates, or other information to the field camp, as needed. During times of degraded HF communications, field camps may call Mac Weather directly. Therefore, it may be necessary to request Mac Weather to direct the field camp to contact Mac Ops.

McMurdo Area Weather Advisories

Mac Weather issues Severe Weather Advisories for the McMurdo Station area. Definitions of the various stages of weather severity follow.

- Condition 3 – When wind speed is less than 48 knots, wind chill temperature warmer than -75 °F, and visibility greater than one-fourth mile.

Note Condition 3 is considered the normal weather condition at McMurdo Station.

- Condition 2 – When at least one or more of the following conditions occurs or is possible: sustained wind speeds of 48 to 55 knots, sustained wind chill temperature of -75 °F to -100 °F, or visibility of less than one-fourth mile sustained for one minute.

- Condition 1 – When at least one of the following conditions occurs or is imminent: sustained wind speed greater than 55 knots, sustained wind chill temperature colder than –100°F, or visibility less than 100 feet sustained for one minute.

Note McMurdo Station current and forecast weather conditions are available on the locally programmed weather channel or on the McMurdo Station Intranet.

Weather Broadcast over Multiple Frequencies

Mac Weather makes weather condition announcements via VHF radio when weather conditions change. To reach as many operational departments as possible, Mac Weather makes this announcement from Mac Ops utilizing the capability of the Zetron console. The operator takes the following steps to assist when Mac Weather makes a severe weather condition announcement, when assistance is needed.

1. Press the green GROUP SELECT 1 button on the Zetron VHF console (button is located to the right of the keypad). This simultaneously selects the following frequencies: INET, Fire, Fuels, MCC/Fleet Ops, Mac Ops, and Field Party Ops.
2. Operator should now turn down the unselect speaker volume to avoid feedback.
3. Instruct Mac Weather to use the console microphone to make the broadcast. When broadcasting, press the microphone transmit button, then wait until the red transmit lights stop flashing before speaking.
4. At the conclusion of the announcement, turn the unselect speaker volume up again and press one of the green SELECT CALL buttons on any frequency to disable the all-call feature.
5. Update the Mac Log with the change in Weather Condition status.

Non-Governmental Activity (including Private Expeditions)

Private expeditions and other activities not related to USAP or other countries' Antarctic programs are known as Non-Governmental Activities (NGA). The National Science Foundation has indicated a policy of offering humanitarian assistance to NGA events when needed, but no additional support or assistance.

1. For ANY NGA contact, regardless of whether information is requested or not, notify immediately:
   - NSF Representative
   - RPSC Area Director
2. Do not provide any program information unless approved by NSF Representative.
3. Record details in *Mac Log*.

Media Contact

Mac Ops does not provide any comments to the media but instead refers callers to the NSF. The supervisor verifies name and contact information of NSF Office of Legislative and Public Affairs (OLPA) point of contact each season.

Note Recent press releases from OLPA are posted online at: **www.nsf.gov/news/**

If a call is received from a media person:

1. Provide caller with NSF Office of Legislative and Public Affairs (OLPA) office phone number and/or e-mail address.
2. Do not provide any information, comment, or your name.
3. Handle call as low priority.

If caller seeks further assistance (e.g. unable to reach OLPA outside business hours):

1. Take the following information and advise it will be provided to NSF:
   - Name
   - Phone number
   - Organization (if applicable)
   - Purpose of call
2. Relay information to McMurdo NSF Representative.
   - If outside business hours, use e-mail and copy supervisors, and OLPA.
   - Record details in *Mac Log.*

Shift Reminders

This list of shift reminders is not an all-inclusive list of operator duties, but instead points out tasks that might be easily overlooked, especially for new operators. Some duties are described elsewhere in this document; others are only indicated here.

At the start of ALL shifts

- **Review**: Before beginning passdown, review *Mac Notes*, E-mail, *Mac Log* Summary.
- **Passdown**: Include review of Helo and Fixed-Wing schedules, changes to the *Daily Field Camp Report*, regional travel in progress, message/conference requests, outstanding daily camp check-ins, and any other pertinent info. Make note of any check-ins due during shift.
- **VCCR**: Adjust screen calibration, adjust gain levels, and make sure all required frequencies are being received, and only in one group each (to prevent feedback).
- **Zetron:** Check both volume levels (Select and Unselect); check mute selections.

- **AOL IM:** If HF Comms are degraded, check that Mac Ops is signed on.

Day Shift specific

- **Early Morning**: Review Helo schedule in more detail.
- **By 1000 hours**: Send *Daily Field Camp Report* via e-mail (accuracy most important), and then update the Camp Report Scroll to reflect the current day's *Daily Field Camp Report*.
- **By 1000 hours**: Send *Vehicle Supported Camp Muster* if required.
- **Before 1730**: Confirm all significant Helo movement (relating to occupancy changes) before end of work day. Prepare fresh hard copy *Daily Field Camp Report* for night operator.

Night Shift specific

- **Early evening**: Print next day Fixed-Wing schedule, transcribe to Aircraft Events form, relay to South Pole and any scheduled field camps.
- **Helo schedule**: Print next day Helo schedule, review carefully and note/highlight any changes in camp occupancy (put-in, pull-out, move, unoccupied, reoccupied). Relay schedule to camps only as requested.
- **File completed schedules**: For Helo and Fixed-Wing in binders above console.
- ***Daily Field Camp Report***: Update electronic and hardcopy as needed. Prepare a fresh hard copy for morning operator, if necessary.
- **Camp Change Slips**: Fill out based on next day Helo and Fixed-Wing schedules and post on console.
- **Midnight**: Exchange TEAC disk. Restart Mac Ops computer. If necessary, restart AOL IM. Log TEAC change and computer restart.
- **At 0500 hours**: Radio checks with South Pole: Check all required frequencies for propagation quality. Check each VCCR group and position (in Mac Ops room) at least once. Check Iridium for battery level and messages. Test Iridium base station by placing or receiving call with South Pole. Record in *Mac Log*.

Throughout ALL shifts as needed

- **E-mail account**: Keep open and watch for new messages; file messages to folders or delete as needed
- **AOL IM**: If HF Comms are degraded, check that Mac Ops is signed on.
- **Zetron:** Check both volume levels (Select and Unselect); check mute selections.

- **VCCR:** Check all required frequencies on receive, no frequency on receive in more than one group, sound waves visible on all used groups (if not, adjust gain), audio selected to speaker instead of handset. Check HF gain levels at least every 3-6 hours and adjust if needed.
- ***Daily Field Camp Report***: Update electronic and hardcopy as needed.
- **Fax machine:** Check frequently, especially for SARSAT alerts.

Emergency Procedures

Search and Rescue (SAR)

This section describes the general actions required of Mac Ops during any SAR event. Additional departmental requirements for specific scenarios are described in Event-Specific SAR/Emergency Scenarios section.

The Mac Ops procedures defined in this guide satisfy the requirements of the following documents, which are both maintained by the SARMC (SAR Mission Coordinator) and are available on a common network drive.

SAR Notification Checklist – details the notification process in the event that an overdue party or distress call is reported by Mac Ops, Mac Center, Firehouse, or Scott Base. The checklist is kept current with names and contact information of individuals filling particular roles.

SAR Evolution Flow Chart – provides an overview of the SAR Notification process in a graphical format.

Note The latest versions of these documents are located at I:\Collaboration\SAR.

SAR Uncertainty Phase

The UNCERTAINTY PHASE may be initiated when an aircraft, regional travel party, field camp, or recreational foot party is overdue for a check-in, according to the SAR Notification Checklist, or a distress call is received. The work center responsible for tracking that party, or which received the distress call, notifies the SAR Response Team.

UNCERTAINTY PHASE is defined by either:

— Overdue check-in per SAR Notification Checklist

— Serious threat to life or health is confirmed and immediate assistance is required

Operator Role - Uncertainty Phase

1. <Send> the **Uncertainty Phase-Distress Call Page** to pager group #533, which reads "**SAR Response Team activation—report to EOC**."

   — If Outlook is unavailable, use telephone to activate pager group #533, which reads: "**SAR Response Team to EOC**."

— If pager system is unavailable, utilize telephone to call individual SAR Response Team members.

2. Notify the party's Point of Contact, if applicable.
3. Inform EOC of updates.
4. Record details in *Mac Log.*
5. Proceed to ALERT PHASE or STAND DOWN.

SAR Alert Phase

If the situation remains unresolved, the Emergency Operations Center (EOC) directs Mac Ops to initiate ALERT PHASE notifications. In certain situations, the EOC may bypass the UNCERTAINTY PHASE and proceed directly to ALERT PHASE.

Operator Role – Alert Phase

1. Upon direction from the EOC, request Firehouse to send the **SAR All-Call** group text page. (Message instructs key personnel to report to designated areas, including EOC.)
2. Upon direction from the EOC, make the following announcement every 15 minutes on VHF Channels: I-Net, Mac Ops, MCC/Fleet Ops, Field Party Ops:

   "Attention all stations, this is Mac Ops with an announcement. A Search and Rescue (drill/operation) is in progress. Please limit radio traffic. This is (only/not) a drill. Mac Ops clear."
3. Upon direction from the EOC, notify **Scott Base Manager** of situation.
4. Inform EOC of updates.
5. Record details in *Mac Log.*

Supervisor Role – Alert Phase

1. Report to Mac Ops and assign off-duty operator(s) to assist on-duty operator or the EOC if needed.
2. Assist operators and coordinate information between operators and the EOC.
3. Set up Emergency Operations Center (EOC).

SAR Deployment Phase

In the DEPLOYMENT PHASE, the SAR team is directed by the EOC to deploy.

SAR Stand-Down

When EOC determines a SAR is resolved, operator informs all personnel involved upon direction from the EOC.

— UNCERTAINTY PHASE Stand-Down:

- <Send> **Uncertainty Phase-Distress Call Stand Down** page, which reads "**SAR Response Team stand down—situation resolved.**"
- Notify field party Point of Contact, if applicable.

— ALERT PHASE or DEPLOYMENT PHASE Stand-Down:

- Upon direction from the EOC, request Firehouse to send text page message to **SAR All-Call** distribution: **"SAR Alert Phase stand down. Situation resolved."**
- Upon direction from the EOC, make the following announcement on VHF Channels: I-Net, Mac Ops, MCC/Fleet Ops, Field Party Ops:

"Attention all stations, this is Mac Ops with an announcement. The Search and Rescue (drill/operation) has stood down. Thank you for your cooperation. Mac Ops clear."

- Upon direction from the EOC, notify **Scott Base Manager** of situation.
- Notify the field party Point of Contact, if applicable.

Event-Specific SAR/Emergency Scenarios

The actions required of Mac Ops during the UNCERTAINTY PHASE are outlined in the Search and Rescue (SAR) section of this guide. This section details additional requirements specific to certain scenarios. The operator should understand the motivation of these requirements and consider applying them to other situations outside of these specific scenarios.

Overdue Regional Travel Check-In

When a party is overdue for a scheduled check-in, immediately:

1. Attempt to contact the party directly. If possible, play check-out on TEAC to confirm ETA or ETR.
2. If initial communications search is unsuccessful and within 5 minutes or less, initiate the UNCERTAINTY PHASE:

— <Send> the **Uncertainty Phase-Distress Call Page** (*See* SAR *Uncertainty Phase section on p.67 for details*).

— Verify ETA, ETR and/or other information using the TEAC recorder.

— Attempt to contact the overdue party at least every 15 minutes.

— Contact party's POC and request names of all members of overdue party and details of travel plans.

— Attempt contact with regional travelers in vicinity of the overdue party's route/destination.

— Inform EOC of updates.

— Record details in Mac Log.

3. Proceed to ALERT PHASE or STAND DOWN:
   - — ALERT PHASE: *See* SAR Alert Phase *section on p. 68 for details.*
   - — STAND DOWN: *See* SAR Stand-Down *section on p. 68 for details.*
4. Proceed to DEPLOYMENT PHASE or STAND DOWN:
   - — DEPLOYMENT PHASE: The SAR team is directed by the EOC to deploy.
   - — STAND DOWN: *See* SAR Stand-Down *section on p. 68 for details.*

Overdue Field Camp Check-In

When a field camp is overdue for a scheduled daily check-in:

1. Attempt direct contact with overdue camp (using all means of available communications including Iridium and text messaging).
2. If initial communications search is unsuccessful, continue as follows through the next hour:
   - — Attempt contact with overdue camp at least every 15 minutes.
   - — Request communications assistance from other field camps or South Pole Station.
   - — Confirm with Fixed-Wing Operations or Helo Operations that camp has not pulled out or relocated.
   - — Question other groups with radio communications (Mac Center, South Pole, or other camps) if and when they last had communications with the party.
3. If no contact after one hour, the UNCERTAINTY PHASE begins:
   - — <Send> the **Uncertainty Phase-Distress Call Page**. (*See* SAR Uncertainty Phase *section on p. 67 for details*)
   - — Inform EOC of updates.
   - — Record details in Mac Log.
4. Proceed to ALERT PHASE or STAND DOWN:
   - — ALERT PHASE: *See* SAR Alert Phase *section on p. 68 for details.*
   - — STAND DOWN: *See* SAR Stand-Down *section on p. 68 for details.*
5. Proceed to DEPLOYMENT PHASE or STAND DOWN:
   - — DEPLOYMENT PHASE: The SAR team is directed by the EOC to deploy.
   - — STAND DOWN: *See* SAR Stand-Down *section on p. 68 for details.*

Overdue Traverse Check-In

If a traverse party is late for an hourly or final check in:

1. Attempt to contact the party directly.
2. If initial communications search is unsuccessful, continue as follows through the next hour:
   - — Attempt contact with overdue traverse at least every 15 minutes.
   - — Request communications assistance from destination sites (e.g. Black Island, New Harbor, Marble Point).
   - — Verify ETA, ETR and/or other information using TEAC recorder.
3. If no contact is made after one hour, the UNCERTAINTY PHASE begins:
   - — <Send> **Uncertainty Phase-Distress Call Page**. (*See* SAR Uncertainty Phase *section on p. 67 for details*)
   - — Inform EOC of updates.
   - — Record details in *Mac Log*.
4. Proceed to ALERT PHASE or STAND DOWN:
   - — ALERT PHASE: *See* SAR Alert Phase *section on p. 68 for details.*
   - — STAND DOWN: *See* SAR Stand-Down *section on p. 68 for details.*
5. Proceed to DEPLOYMENT PHASE or STAND DOWN:
   - — DEPLOYMENT PHASE: The SAR team is directed by the EOC to deploy.
   - — STAND DOWN: *See* SAR Stand-Down *section on p. 68 for details.*

Medical Request

Field Party

If a field party requests to speak with the Medical department:

1. Determine whether request is urgent or routine.
2. Contact McMurdo Medical:
   - — Clinic Open: Phone Clinic and request a medical provider.
   - — Clinic Closed (or no answer): Page RPSC Lead Physician.
3. Connect medical provider to field party by radio-phone patch, telephone transfer, or arrange contact by Iridium.
4. Record details in *Mac Log*.

Note If a medical evacuation is required, Medical notifies the SAR Mission Coordinator.

McMurdo (Local)

Refer medical requests from within the McMurdo community to the Firehouse if Clinic is closed.

The Firehouse keeps a list of the current McMurdo Medical Clinic on-call schedule for requests outside of Clinic hours.

Distress Call

Field Parties

A distress call indicates a serious threat to health or safety of personnel, and/or requires immediate emergency assistance.

1. If a distress call is received from a field party, record:
   - — Time of call
   - — Method of contact (include frequency or phone number)
   - — Call sign
   - — Location
   - — Nature of the call (aircraft incident, injury/medical, lack of shelter, etc.)

Note If uncertain whether or not the call constitutes a distress call, have the field party stand by while you notify Mac Ops supervisor or SARMC.

2. <Send> the **Uncertainty Phase-Distress Call Page**.
   - — Depending on situation, SARMC may initiate UNCERTAINTY PHASE, proceed directly to ALERT PHASE or DEPLOYMENT PHASE, or not initiate any SAR phase. (*See* Search and Rescue (SAR) *section for details*)
   - — Inform EOC of updates.
   - — Record details in *Mac Log*.

McMurdo (Local)

If a distress call is received requiring response within McMurdo Station or surrounding areas accessible by the Fire Department (including established roadways and airfields):

1. Dial **911** (Firehouse).
   - — Describe situation to dispatcher.
   - — Transfer call or indicate channel/frequency for direct communications.

2. Record details in *Mac Log*.

Dive Accident

In the event of a dive accident, regardless of location:

1. Dial **911** (Firehouse).
   - — Describe situation to dispatcher.
   - — Transfer call or indicate channel/frequency for direct communications.
2. Record details in *Mac Log*.

Hazardous Materials Spill

In the event of a call for a hazardous material spill, regardless of location:

1. Dial **911** (Firehouse).
   - — Describe situation to dispatcher.
   - — Transfer call or indicate channel/frequency for direct communications.
2. Record details in *Mac Log*.

SARSAT Beacon Alert

Mac Ops is the point of contact in the event an activated emergency beacon signal is detected by the Search and Rescue Satellite (COSPAS-SARSAT) system for a beacon registered to the USAP or possible geographic location in the Antarctic.

The US Mission Control Center, Maryland (USMCC) notifies Mac Ops if they receive a hit for a beacon that is registered to the USAP.

The Rescue Coordination Center (RCC) of Canberra, Australia or Wellington, New Zealand, notifies Mac Ops if a beacon hit is detected as originating from a geographic location in the Antarctic. Other SARSAT organizations may also contact Mac Ops for assistance regarding beacon hits in the area.

Additional information on COSPAS-SARSAT is available in Appendix 2, SARSAT Theory of Operation.

Notification Procedure

An operator normally receives a SARSAT beacon alert via fax message for USAP-registered beacons, or telephone for all other notifications.

1. If notified by telephone, record all information, including a contact name and phone number.
2. Make the following notifications immediately by sending the **SARSAT Beacon Alert Page**, which reads "**SARSAT Beacon Alert – Please contact Mac Ops x2586 for more information**":
   - — Mac Ops Supervisors

— SARMC

- If no response, wait 3 minutes and page again and/or phone.
- If still no response, immediately page SARMC Alternate.

3. If a beacon serial number is identified in the notification:

   — Confirm whether it matches a beacon issued to a USAP field party or aircraft (filed in the Mac Ops Emergency Workbook under "Emergency Beacons").

   — Immediately pass this information to the SARMC.

4. Depending on situation, SARMC may initiate UNCERTAINTY PHASE, proceed directly to ALERT PHASE or DEPLOYMENT PHASE, or not initiate any SAR phase. *(See* Search and Rescue (SAR) *section for details).*

5. Inform SARMC of updates.

6. Record details in *Mac Log.*

Emergency Operations Center (EOC)

The following procedure occurs upon initiation of a disaster response event, requiring the set up of communications equipment for use by the disaster response plan command team.

The Emergency Operations Center (EOC) is located in Bldg 165, Room 119. The EOC is configured with three VHF channels and four phone lines for command and control operations during a disaster response event or drill. In addition, there are live LAN jacks located on the center panel of the MUTOA, and at terminals 82 and 83 on the back wall of the EOC. All communications equipment is stored in the disaster response cabinet. Keys to the disaster response cabinet are held in the Mac Ops workcenter and by the Systems Supervisor.

Operator Role – EOC Set-up

Upon the initiation of SAR ALERT PHASE, disaster response event or drill, the operator proceeds as follows:

1. Notify Mac Ops supervisors.
2. The Mac Ops supervisor or designee proceeds to set up the EOC
3. Note all notification times and relevant communications and enter in *Mac Log.*
4. Additional operator(s) may be assigned to assist in Mac Ops or in the EOC.

VHF Base Stations

Three VHF base stations are stored in the disaster response cabinet.

1. Position table(s) against the wall under the MUTOA to hold the radios and telephones.
2. Connect each base station to its color-coded jack in the MUTOA.

3. Connect power supply for each base station.

Note The toggle switch on the base stations must be set to "F1."

4. Perform radio checks with Mac Ops or the Firehouse on each radio to confirm the equipment is operational.

Telephone

The EOC is wired for four phone extensions: 3555, 3556, 3557 and 3558.

1. Connect each telephone to its color-coded jack on the MUTOA.
2. Check each telephone line for a dial tone.
   - — Extension 3555 is the primary line.
   - — If extension 3555 is busy, incoming calls will rollover to the next available line.
   - — Extensions 3555 and 3557 have 2-way speaker phone capability.
   - — All lines have access to place outgoing calls via the Iridium Sailor line. (Note that incoming calls to the sailor line will ring at Mac Ops extension 2586.)

Announcement

After the EOC setup is complete, the following announcement is made on I-net, Mac Ops, MCC/Fleet Ops, and Field Party Ops upon approval from the SARMC, and repeated as necessary:

"Attention all stations, the EOC is now operational and can be reached at extension 3555."

Operation

Bring the following (most current) reference material to the EOC:

1. Two copies each of the following:
   - — Mac Ops Quick Reference Phone List (or equivalent)
   - — SAR Notification Checklist (I:\Collaboration\SAR)
   - — Joint Antarctic Search and Rescue Team (JASART) Current Primary Roster (I:\Collaboration\SAR)
2. One copy of the "Phone Book" binder from the Mac Ops workcenter

HF Propagation – Blackout or Severe Degradation

When HF propagation becomes severely degraded or blacked out, the operator monitors conditions, considers alternate communications, and notifies supervisor as required. The supervisor notifies the community if communications are greatly affected for a prolonged period.

For more information on Space Weather, its affects on HF radio communications and terminology used within this section, see Appendix 3, HF Radio Propagation Monitoring.

When HF communications become significantly degraded or blacked out:

Operator Role

1. Check e-mail account for alert or warning messages from the National Oceanic and Atmospheric Administration (NOAA) Space Environment Center. Descriptions of subscribed messages are tabulated at the end of this section.
2. Check the following graphs on the NOAA Space Environment Center website (http://www.sel.noaa.gov/today.html).
   - — Solar X-ray Flux graph – Spikes on this graph indicate solar flares. Generally, flares of M-class or greater (using GOES-12 red line) can impact HF propagation.
   - — Proton Flux graph (Satellite Environment plot) – As proton flux reaches Proton Event level, an HF communications blackout typically occurs in polar regions. A Proton Event is defined by energy thresholds >10MeV (red line) reaching a level of 101 protons/cm2-s-sr (horizontal dashed line).
   - — Kp Index graph (Satellite Environment plot) – K-indices of 5 or greater indicate storm-level geomagnetic activity. Geomagnetic activity reaches the earth one to four days after a solar flare and can affect HF communications by causing additional noise, fading, garbled or otherwise distorted transmissions.
3. Page supervisor for any of the following:
   - — HF Communications with South Pole Station are lost due to poor propagation.
   - — Proton Flux level reaches 101 (dashed line), using threshold >10MeV (red line). See step 2 above.
4. Utilize America On-Line (AOL) Instant Messenger for South Pole Communications if satellite is available.
5. Continue monitoring NOAA Space Environment Center website *(step 2 above)*, e-mail alerts, and observed communications quality until propagation returns to normal.
6. Record details in *Mac Log*, including quality and strength of radio contacts, frequency, and other radio party involved.

Note When satellite connectivity is lost, e-mails marked as urgent will be sent via Iridium data link to South Pole Communications.

Supervisor Role

1. Note any field camps that are without communications if they have lost HF capability.
2. Verify Iridium base stations are in full operational status.

3. Advise Mac Center of any significant events and recommend alternate frequencies.
   - — During periods of geomagnetic activity, higher frequencies can become unusable. Suggest moving to lower frequencies.
   - — During proton events or short-wave fadeouts (SWFs), lower frequencies become unusable for various durations. Suggest moving to higher frequencies.
4. Consider community notification as described below.

Community Notification

If supervisor determines current and/or forecasted conditions significantly impact flight or field operations, e-mail notifications are sent to the community including a brief description of current conditions, the cause, and an estimated recovery time.

Supervisor alerts the following personnel:

Table 12: HF Propagation Notification List

SFA, MCM 139 Current Ops	Helo Ops Supervisor (RPSC)
SFA, JTF SFA Deployed Commander	PHI Senior Pilot (RPSC)
139 EAS Supervisor of Flying	MCM-Fixed Wing Coordinators
MCM-SOPP Air Traffic Manager	Kenn Borek Air Senior Pilot
SPPO Base Ops, Chch (Christchurch)	SAR Team Leader (RPSC)
MCM-SOPP Site Manager	Science Support Manager (RPSC)
SFA 304 Commander	IT Manager (RPSC)
SFA Information Manager	IT Comms Supervisor (RPSC)
MCM-NSF Representative	POL-Comms (RPSC)
MCM-NSF Station Manager	POL-Met (SP Meteorology, RPSC)
MCM-RPSC Site Manager	Scott Base Comms
MCM-Mac Center (SOPP)	Scott Base Program Support Manager
Mac Center Supervisor (ATS)	Scott Base Telecom
MCM-Weather Forecaster (SOPP)	MCM-Mac Ops (RPSC)
MCM-Weather Observer (SOPP)	Mac Ops Station Communications Supervisor (RPSC)
MCM-SOPP Met Manager	Mac Ops Operations Supervisor (RPSC)

Table 13: HF Radio Propagation Alerts, Warnings, and Reports

Code	Name and Description
RSGA (SEC)	**Report of Solar-Geophysical Activity** Daily report of forecast and observed conditions issued at 2200 hrs UTC
dhfpr (IPS)	**IPS Daily HF Propagation Report** Daily summary and three day forecast of HF propagation and ionospheric conditions in the Australian region
hf-warning (IPS)	**IPS HF Comms Warning** Indicates predicted disturbances of ionospheric conditions in the Australian and New Zealand regions, and provides relevant HF frequency management advice
ALTXMF (SEC)	**ALERT: X-ray Flux exceeded M5** Indicates solar flare of M5 class or higher has occurred
WARK06 (SEC)	**Warning: Geomagnetic K-index of 6 expected** Indicates geomagnetic storm of level 6 or higher is ***predicted***
ALTK06 (SEC)	**ALERT: Geomagnetic K-index of 6** Indicates geomagnetic storm of level 6 or higher is ***in progress***
WARPX1 (SEC)	**WARNING: Proton 10MeV Integral Flux above 10pfu expected** Indicates a proton event is ***predicted***
ALTPX1 (SEC)	**ALERT: Proton Event 10MeV Integral Flux exceeded 10pfu** Indicates a proton event is ***in progress***
SUMPX1 (SEC)	**SUMMARY: Proton Event 10MeV Integral Flux exceeded 10pfu** Summarizes proton event ***onset time, maximum flux, & end time***
(SEC) – Space Environment Center; (IPS) – Ionospheric Radio and Space Services	

Power Outage or Interruption

Building 165 is equipped with a backup generator and each VCCR unit is equipped with a UPS. The backup equipment is designed to provide continuous power to critical equipment during a power outage or interruption. Because of the potential impact to communications equipment, any power interruptions should be reported immediately to the supervisor.

If a power outage or interruption is noted in the work center:

Operator Role

1. Notify the Mac Ops supervisor.
2. Record details in *Mac Log*.

Supervisor Role

1. Assess situation and determine whether communications equipment is affected. If required notify:

   — SOPP technician

   — RPSC technician

   — Firehouse (to indicate that an outage occurred)

Seasonal Turnover and Winfly Operations

Winter Flight Support

Mac Ops winter personnel provide communications support in the event of a medical emergency flight and must be prepared should such a situation arise. In addition, the winter season Mac Ops personnel prepare for end of winter station evolution: testing communications equipment and verifying associated WINFLY operations.

End of Austral Summer Season

Contact the BITF Communications Technician well in advance of the scheduled station closing date, to allow time for testing and troubleshooting, if necessary.

Throughout the Winter

- Maintain general readiness for emergency flight operations.
- Conduct weekly radio checks with South Pole and Palmer Station, as required.
- Work with Comms Shop and Telco to address equipment issues.
- Provide communications for Black Island Traverses and Windless Bight trips.
- Assist in Mass Casualty Incident preparation and debrief.
- Function as point of contact for Mac Ops off-continent supervisor.
- Attend leadership meetings and coordinate workcenter projects.
- Monitor HF conditions and solar events.
- Notify community of projected Aurora activity.
- Provide weekly sitrep and labor allocation.
- Provide other administrative tasking as required.

Winter Medical Evacuation Flight

A medical emergency during the winter season may result in a winter season flight to McMurdo Station to evacuate a patient. Preparation time before the launch of an aircraft

depends on the status of the runway. Mac Center will advise Christchurch of McMurdo Station runway status and inform Mac Ops of flight schedule estimates.

Each medical evacuation situation evolves under different conditions. Parameters typically include the stage of the winter season, patient status, and aircraft availability.

The operator uses the following list as a general guide to prepare for a winter-season medical evacuation.

- Coordinate with Mac Center to test HF radio equipment on primary, secondary, and tertiary flight-following frequencies.
- Advise South Pole Station of the medical-evacuation flight possibility at the earliest opportunity. Continuously update South Pole Communications of the flight status.
- Schedule staff as needed to assist in radio checks, fax activity, and routing of off-continent calls. Coordinate staffing schedules with the requirements of Mac Center, Mac Weather and flight schedule.
- Before flight operations commence, activate the TEAC Communications Recorders in Mac Ops to record all Iridium, VHF, and HF frequencies. Consider the possible need to change the recording medium if flight operations exceed 24 hours.
- During the actual flight operations, monitor the primary, secondary, and tertiary flight-following frequencies in Mac Ops. Track flight status and aircraft departure and arrival times for community and South Pole notification.

Eight Weeks Before First WINFLY Flight

The operator starts preparation for WINFLY approximately two months before the first scheduled flight. This involves coordination between Mac Center, South Pole Station, and possibly the ATS and Field Party Radio Shop Communications Technician, if troubleshooting is needed. Weekly testing of HF radio equipment and flight following frequencies should get underway.

Four Weeks Before First WINFLY Flight

The Mac Ops supervisor completes the following steps before the first WINFLY flight. No specific order is required.

- Continue weekly or more frequent testing of HF radio equipment and flight-following frequencies.
- Upon request, assist the Network Administrator to verify the McMurdo Station e-mail distribution list for aircraft messages is updated with winter personnel names.
- Upon request, assist Christchurch message center staff in verifying the aircraft message mailing list.

- Advise the South Pole Manager and Communications Technician of the WINFLY flight schedule and any related changes or updates.
- Mac Weather will receive launch status information from Christchurch once the weather forecast is sent. Mac Weather may e-mail the launch status of the flight to a selected list of McMurdo Station personnel. Verify that Mac Ops and South Pole Station receive the message in a timely manner.
- Begin planning a schedule for Mac Ops hours of operation during WINFLY, based on flight schedule plans. Coordinate with Mac Center, Mac Weather, and South Pole Station.
- Mac Center will advise of its staffing levels for the period in advance of the flight launch. Mac Ops should have an operator available to assist with radio checks and possible equipment-related troubleshooting.

During WINFLY Flight Operations

- Ensure that the TEAC Communications recorders in Mac Ops are recording all Iridium, VHF, and HR frequencies during flight operations.
- Monitor the primary, secondary, and tertiary flight-following frequencies in Mac Ops during flight operations. Track aircraft departure and arrival times, as well as flight status, for community-notification purposes.
- Be prepared to assist Mac Center, South Pole Station, or any aircraft on Mac Ops Field Party frequencies, if needed (for relays or radio phone patches).
- Inform South Pole Station in a timely manner of flight cancellations, delays, or schedule changes due to weather. South Pole Station may have only one individual available to flight-follow the WINFLY aircraft, so relay of updates is critical to personnel scheduling.

Mainbody Opening Procedures

Before Mac Ops begins 24-hour operations, it is necessary to set up the office, conduct training, and to advise the community of the Mac Ops opening date and of NSF travel safety policies. Operators also begin phasing into the shift schedules.

Discussion

Mac Ops operates during the austral summer, from early October through late February, 24 hours a day, seven days a week and as long as field camps are still in the field, or any party spends the night in the field. It typically requires several days to set up the office and conduct training for the operators before Mac Ops begins 24-hour operations. It is also necessary to advise the community of the Mac Ops opening date and various NSF travel guidelines. Additionally, operators begin phasing into the shift schedules.

Opening Procedure

Before Mac Ops begins 24-hour operations, complete the following:

- Train new and returning operators in the use of all equipment.
  - — Conduct practice HF and VHF radio-phone patches. Check all radio equipment to ensure it is working properly.
  - — Review and practice telephone procedures.
  - — Review science-group activity and locations.
  - — Review procedures and policies (ideally completed before deployment)
- Establish the *Mac Notes, Mac Log*, and *Daily Field Camp Report* (with mailing lists).
- Photocopy Mac Ops logs and documentation forms:
  - — McMurdo Regional Travel Check-out Log
  - — Daily Aircraft Events log
  - — Message/Conference Request form
  - — SAR Checklist
  - — Iridium directory and speed-dial lists
- Create file folders for each log and post for daily use.
- Prepare the binders for Fixed-Wing schedules, Helo schedules, and *Mac Notes*.
- Update telephone lists in the phone book and on the Mac Ops console.
- Update the Emergency Workbook binder with current information, updated Search and Rescue procedures, dive-accident procedures, regional travel policies, and emergency communications procedures.
- Set up a filing system for Mac Ops Communications Briefing forms and other grantee information.
- Verify the HF Conference schedule is appropriate for all parties involved.
- If possible, arrange for the operators to meet with Mac Weather and Mac Center to discuss how Mac Ops can assist both departments throughout the season, and vice versa. This is particularly helpful for new operators.
- Compose an e-mail to the community advising when Mac Ops will begin 24-hour operations (this is the responsibility of the Station Communications Supervisor).
- Update all travel policy and procedure documents. Send copies to any departments that conduct travel to the field or on the sea ice (Fleet Ops, Communication Technician's Shop, Berg Field

Center [BFC], Field Safety Training, Mechanical Equipment Center [MEC], Carpenter's Shop, Crary Laboratory, General Assistants [GA] Supervisor, and others). Encourage the supervisors of these departments to schedule a communications briefing with the Coordinator.

Note NSF dictates travel policies. However, Mac Ops distributes travel policy information and check-out procedures to grantees and departments conducting operations off of established roadways.

On the Morning that 24-hour Mac Ops Operations Begin

- Call the Firehouse and advise that Mac Ops is now operational 24 hours and will take check-outs for groups traveling off established roadways.
- Ensure that the TEAC Communications recorders in Mac Ops are recording all Iridium, VHF, and HR frequencies during flight operations.
- Inform South Pole Station that Mac Ops is beginning 24-hour operations and is able to assist with weather patches, conference requests, and flight information.

Reduced Operations for Winter Operations

Once all camps are closed and pulled out, Mac Ops typically remains operational for flight operations support until South Pole Station closes for the winter. Depending on flight schedules and South Pole's closing date, hours of operation may be reduced. This allows for one or two operators to leave before Mac Ops ceases operations for the austral summer. However, as no two seasons are the same, the operational hours and significant dates for Mac Ops vary from season to season.

Prior to Reducing Hours of Operation

If needed:

- Prior to the effective date of change in the operational hours, send an e-mail to various departments and personnel informing them Mac Ops is reducing its hours of operation. In addition, also indicate that the Firehouse will take all regional travel check-outs effective the day Mac Ops reduces hours of operation. Note that all other communication needs can be addressed by Mac Ops during normal business hours.

On the Day That Hours of Operation are Reduced

If needed:

- In the morning, notify the Firehouse (via phone) that Mac Ops is ceasing 24-hour operations, review the hours of operation, and confirm that all check-outs will go to the Firehouse for the rest of the season.
- Notify South Pole Station of Mac Ops' new hours of operation via HF radio.
- The evening operator forwards any relevant passdown information to the Firehouse at the close of Mac Ops' business day.

Additional Mainbody Closing Procedures

- Gather and archive information for next season (*Mac Notes*, informational e-mail).
- Empty the e-mail account and clear-out computer files.
- Pack files and binders. Retrograde any items not needed for next season.
- Pack up office equipment and appliances.

Appendix 1: Radio Protocol & Techniques

The following techniques, phrases and alphabet are used for general radio communications.

- Conduct radio transmissions concisely and in a normal conversational tone.
- Enunciate words clearly and distinctly.
- Maintain an even rate of speech.
- Maintain speaking volume at a constant level. Do not shout into a microphone.
- Make full use of standard phrases.

Note Refer to the following Radio Communications, Phonetic Alphabet, and Words and Phrases tables.

- Use plain English or standard codes and abbreviations. Phonetic spelling may be required if propagation is poor.

Table 14: Phonetic Alphabet

Alphabet	Description	Alphabet	Description	Alphabet	Description
A	Alpha	J	Juliet	S	Sierra
B	Bravo	K	Kilo (Kee'-Low)	T	Tango
C	Charlie	L	Lima (Lee'-mah)	U	Uniform
D	Delta	M	Mike	V	Victor
E	Echo	N	November	W	Whiskey
F	Fox trot	O	Oscar	X	X-ray
G	Golf	P	Papa	Y	Yankee
H	Hotel	Q	Quebec	Z	Zulu
I	India	R	Romeo		

Table 15: Radio Communications Words and Phrases

Words/Phrases	Description
Acknowledge	You received and understood this message.
Affirmative	"Yes" or "Permission granted."
Break	Separation between portions of a message.
Broken	Your transmission is broken. It is incomplete.
Clear	Transmission ended and no response expected.
Correction	An error has been made in the transmission, correct version is....
Garbled	Your signal clarity is garbled and unreadable.
Go Ahead	Proceed with your message.
How Copy	How do you read this transmission?
I Say Again	Self explanatory.
Loud and Clear	Your signal strength is loud and your signal clarity is clear.
Negative	"No," "That is not correct," or "Permission not granted."
Over	My transmission is ended and I expect a response.
Out	This conversation is ended and no response is expected.
Read Back	Repeat all or a specified part of a message exactly as received.
Roger	Have received all of your last transmission.
Say Again	Repeat all or a specified part of your last transmission.
Speak Slowly	Self explanatory.
Standby	Self explanatory.
That is Correct	Self explanatory.
Unreadable	Your signal clarity is unreadable.
Verify	Check text of message and send correct version.
Weak but Readable	Your signal strength is weak but your signal clarity is readable.
Weak and Unreadable	Your signal strength is weak and your signal clarity is unreadable.
Wilco	Your last message was received, understood, and will be complied with.
Words Twice	Send every word twice.

Appendix 2: SARSAT Theory of Operation

Discussion

COSPAS-SARSAT is an international Search and Rescue system for detection and location of emergency beacons carried by ships, aircraft or individuals. COSPAS-SARSAT consists of a network of satellites, ground stations, mission control centers and rescue coordination centers. The National Oceanographic and Atmospheric Agency (NOAA) has oversight of the COSPAS-SARSAT system via the US Mission Control Center, Suitland, Maryland.

Three types of beacons are detected by the system: Emergency Locator Transmitters (ELTs) carried by aircraft, Personal Locator Beacons (PLBs) carried by individuals and Emergency Position Indicating Radio Beacons (EPIRBs) carried by ships. ELTs and EPIRBs are configured to activate automatically upon impact or contact with water and may also be manually activated. PLBs must be activated manually. All three types transmit a continuous tone and data stream on 406 MHz and a homing signal on 121.5 MHz, both of which are received by the COSPAS-SARSAT system. From an activated 406 MHz beacon's data stream, the satellite determines the beacon's latitude and longitude, identification number and the beacon's owner (if registered.) At high latitudes, the information is stored aboard the satellite and relayed once the satellite is in view of a Local User Terminal (LUT), or ground station. The data is then transmitted from the LUT to the USMCC.

Based on the beacon identification number or geographic location, the USMCC determines the point of contact and sends an automatic fax message to notify them of a hit. Initial fax notification is typically one or two pages, and is usually followed up by additional Faxes as subsequent satellite passes triangulate the exact latitude and longitude of the hit.

If faxing is unavailable, the USMCC will contact Mac Ops via telephone. During the austral winter, Mac Ops is staffed during normal business hours and the inbound phone line forwarded to the Firehouse after hours. Firehouse personnel are trained to page the SAR Mission Coordinator and/or Mac Ops in the event of a beacon alert notification via telephone after normal business hours. The USMCC has also used a fax number at the NSF Office of Polar Programs office in Washington, D.C. as a backup method of notification. A copy of any fax sent to Mac Ops by the USMCC is also sent to the NSF fax number in Washington, D.C.

The USAP also participates in the COSPAS-SARSAT system by maintaining and operating a COSPAS-SARSAT orbitography beacon (Local User Terminal or LUT) installed at the McMurdo Transmitter Facility. The orbitography beacon transmits a signal similar to a distress beacon used by the USMCC as a calibration source to update orbital ephemeris data for each of the system satellites.

Appendix 3: HF Radio Propagation Monitoring

A greater understanding of space weather and its effect on current HF propagation conditions can be obtained from the two websites that Mac Ops monitors; the NOAA Space Environment Center (SEC) www.sel.noaa.gov, and Ionospheric Prediction Services (IPS) http://www.ips.au.gov. These sources provide e-mail alerts and warnings relevant to HF communications.

A general description of each website follows, along with a brief overview of content pertinent to local propagation conditions. Spending time familiarizing yourself with these websites and their layout and content will allow these sites to be useful tools as you learn to understand space weather and its effect on HF communications. It is recommended that you view the websites at the same time you work your way through this appendix.

NOAA Space Environment Center

SEC provides educational materials, real-time space weather data, alerts and forecasts, and comprehensive historical data archives.

Educational materials:

SEC's education section contains useful educational tools and reference materials including:

- Space weather primer. Relevant topics to review should include:
  - — Coronal Holes
  - — Coronal Mass Ejections
  - — Proton Events
  - — Geomagnetic Storms
  - — Disrupted communications systems
- Glossary of terms. Referencing this as you read this appendix may be helpful.
- Frequently asked questions

Once you have a grasp of the basics presented in the Education section, selecting Space Weather Now from the website menu provides you with the following:

Space Weather Now Page

- NOAA Scales, Maximum or Currently: Selecting these will provide more detailed descriptions of the storm or blackout level criteria.
- Real-time solar wind factors, including solar wind speed, magnetic field direction and dynamic pressure: When these indicators move into the red, the solar wind stream and the earth's magnetic

field have altered, potentially disrupting HF communications by distorting the ionosphere, thus causing radio signals to scatter and fade.

- Auroral Map: The auroral map shows the current extent and position of the auroral oval at each pole. As auroral activity increases, the oval changes from yellow to red. Auroras result from energetic particles striking the ionosphere, as does geomagnetic storming. An active auroral oval will often correspond to geomagnetic storming. Click on the map to see a map of the Southern Hemisphere and more details.
- Latest Alert, Warning or Watch: Lists the most current alert, warning or watch issued by the SEC.
- Today's Space Weather: Select Today's Space Weather to view current real-time space weather data.

Today's Space Weather Page

Today's Space Weather lists the current SEC three-day space weather forecast and real-time data. A brief summary of this site feature follows.

- Three-Day Solar Geophysical Forecast: This three-day space weather forecast is issued daily at 2200 Hours, Coordinated Universal Time.
- Solar X-Ray Flux: Includes a three-day view of the x-ray activity of the sun. Spikes above C9 in strength indicate a solar flare. Flares greater than M1 have the ability to impact communications, especially in polar regions.
- Satellite Environment Plot: Shows past 72-hour readings of proton flux, electron flux, Hp and Kp indexes. For an enhanced view of a plot, click on the plot.
  - — Levels greater than 10 MeV on the proton flux plot have the ability to impact communications. If communications difficulties are experienced, move to a higher frequency.
  - — The Kp index measures geomagnetic activity in a range from 0-9. Five and above constitute major geomagnetic storming. If communications difficulties are experienced, move to a lower frequency.
- Historical data can be viewed by selecting Space Weather Data on SEC's File Transfer Protocol (FTP) Server.

IPS Real-Time Space Weather Status Panel

IPS is an agency of the Australian government that monitors space weather conditions. Much of the information available from IPS is also available from the SEC website, but in a different format.

Select Space Weather from the menu. This page displays current solar, HF propagation, ionospheric, and geomagnetic conditions. Boxes flash red when adverse conditions are noted or warnings and alerts are in effect. For more details on a specific panel, select the panel.

Some of the panels displayed on this page are not relevant to polar regions, but pay attention to the Polar Cap Absorption (PCA) panel. A PCA occurs when a solar flare affects the ionosphere's D layer, causing this layer to absorb HF radio signals. The result is an HF radio blackout. The PCA panel is a statistical representation of the activity shown on the Today's Space Weather page's Satellite Environmental Plot for Proton Flux. The riometer reading in this panel is a measure (in dB) of the amount of energy absorbed from a 30 MHz radio signal. When the riometer hits 1.0 dB, the panel turns red. The higher the dB, the more severe the PCA.

Community E-mail Notifications

Degraded or blacked out HF communications due to solar flares and geomagnetic activity can last anywhere from a few minutes to a few days. During these events, the Mac Ops supervisor sends an e-mail to the community of users that is listed in the procedure. This e-mail is generally sent as soon after the start of the event as is practicable. Each morning thereafter, an e-mail with updated information is sent prior to the day's operations until HF communications are reestablished.

- The e-mails can be brief; many details aren't necessary. A few sentences explaining in general terms what has caused the degraded HF communications or blackout, the expected duration, and which frequencies (i.e. low or high) might recover first are sufficient. This information is usually obtained from the e-mail alerts and warnings Mac Ops receives in Outlook, but referencing the SEC and IPS web site may be helpful too. If there is no indication of the expected duration from any of the e-mails or from the websites, then merely state that the expected duration is unknown. Assure the community that updates will be sent as Mac Ops gets more information.

Appendix 4: HF Technical Control Station

This section details how Communications Technicians monitor and control High Frequency (HF) radio equipment using the Technical Control Station and RCOMM telnet software.

Technical Control Stations (TCS) are used to verify VCCR settings, reconfigure HF receivers and transmitters, perform equipment diagnostics and control non-voice HF radio communications (RTTY). These operations are accomplished using Radio Control Operation, Maintenance and Management (RCOMM) software installed on the TCS terminal. Building 165, Room 210 (Mac Ops Remote) Mac Ops Remote Console, McMurdo Transmitter Facility (T-Site) and Black Island Telecommunications Facility are each equipped with TCS terminals. Each TCS terminal uses the McMurdo Station LAN to connect to group transmitter and receiver controller units at T-Site and Black Island via Ethernet modems.

Note Mac Ops Operators do not operate the TCS. If there is a suspected problem with the TCS or any of the following equipment, notify the Communications Technicians.

HF Receivers

Nineteen HF receivers, installed at Black Island (BI), provide McMurdo Station's primary HF receive signals through the VCCR consoles. The receivers are organized into groups of up to four, with each group headed by a receiver controller. The receiver controller for the group can be used to power the receivers on or off remotely. In the event of a VCCR touch screen system malfunction for antenna selection, a Communications Technician can manually select an antenna for the work receiver in the group with commands to the group receiver controller. The guard receivers in the group are manually patched to the omni-directional antenna at BITF and the receivers' antennas cannot be changed by the TCS.

Each controller and receiver has a three-digit equipment address that allows RCOMM software to interface with the equipment. This address is also used as the reference number for each BI receiver in all HF configuration documentation and labeling. Consult the HF Configuration Sheets in the Information Guide for equipment addresses and group configurations. Receiver equipment addresses are also found under the glass on the Mac Ops Remote console. Communications Technicians can use the TCS to verify that receivers correctly respond to touch-screen selection, and to assign new frequencies to the programmable VCCR buttons.

Transmitters

Eight transmitters installed at the McMurdo Transmitter Facility (T-Site) interface with the TCS via RCOMM. Like the receivers, the three-digit equipment address of the transmitters is used as a reference number in TCS documentation and labeling. Consult the TCS HF Configuration Sheets in the Communications Information Guide for equipment addresses.

Disconnect Users with EM1000 Killer

Only one TCS terminal is allowed access to BITF or McMurdo Transmitter Facility (T-site) Ethernet modems at one time. When connecting while another user is already online, RCOMM displays "Connecting to 157.132.xxx.xxx" as it attempts to connect. After attempting a connection for 60 seconds, RCOMM displays "Unable to connect to 157.132.xxx.xxx." Contact the Communications Technician at BITF or T-Site to request access. If unable to contact a technician, follow the steps below to disconnect the other user from the modem.

1. On the TCS terminal, double-click the EM1000 Killer icon on the desktop.
2. The EM1000 Killer window appears. Select the right arrow to view available options. Highlight the connection to disable (Black Island, T-Site, or TCS).
3. Select Break Connection.
4. EM1000 Killer connects to another port on the selected modem and disconnects the user. After several minutes, the EM1000 device disconnects. The disconnected user receives the message "Connection Closed."
5. Exit from the EM1000 Killer program.

Enable RCOMM Link

To establish a connection to a receiver, group controller, or transmitter:

1. Double-click the RCOMM icon.
2. Select Connect on the menu bar.
3. Select Remote System. The Connect window appears.
4. Select the arrow on the Host Name field to view the options.
5. Select on the desired location (BITF for receivers and group controllers, or T-Site for transmitters).
6. Type **8888** in the Port field.
7. Select Connect.
8. RCOMM accesses the modem at the remote location and displays the message "`connected to 157.xxx.xxx.xxx`" on the bottom of the window.
9. Enter the address of the group controller, receiver, or transmitter desired in the Equipment Address window. Delay should be set at 0.5.
10. Press TAB twice to enter the command window.

It's now possible to enter commands and change settings on the equipment.

Disconnect RCOMM Link

Because the connections to the Ethernet modems at the McMurdo Transmitter Facility (T-Site) and BITF are shared, it is important to disconnect from the modems once finished. Also, transmit or receive equipment may inadvertently shift frequencies due to noise or static charge if the RCOMM connection remains enabled for an extended period of time.

1. Select Connect on the menu bar.
2. Select Disconnect to log off the modem, but keep the RCOMM program activated. The bottom, gray line of the box will display "Disconnected."
3. Or, click Exit to disconnect from the modem and exit the RCOMM program entirely.

Programming Channels

Ten touch-screen buttons in the Technical Control Station and Mac Ops frequency groups can be reprogrammed to different frequencies. These buttons are designated RCOMM 1-8, RTTY 1, and RTTY 2. To program new frequencies for these buttons, the Communications Technician uploads new channel information into the receivers and transmitter of the specific frequency group. Each frequency used in the USAP program is assigned a channel, with each channel consisting of the operating parameters and frequency information necessary to reprogram the equipment at BITF, the McMurdo Transmitter Facility (T-Site), and touch-screen consoles.

To program a new frequency is a two-step process: first, retrieve the channel information for the desired frequency; second, store the information in the equipment. It is necessary to store the same channel information into each of the work and guard receivers, if any, and into the transmitter.

Reprogram VCCR Channels

To program a new VCCR channel, follow the steps below.

1. Open RCOMM and connect to BITF.
2. Type the equipment address of the work receiver to reprogram.
3. Press TAB twice to access the main section.
4. To recall the new channel number, press RCxxx (using the new channel number) and press ENTER.
5. To store the new channel number, press STxx (using the RCOMM or RTTY button's channel number) and press ENTER. (For example, to reprogram RCOMM8 [channel 38] to frequency 9213 [channel 231], press RC231 ENTER, ST38 ENTER).
6. Change the equipment address to the first guard receiver and follow Steps 4 through 6 to reprogram the first guard receiver.

7. Perform the same process for the second and third guard receivers, if necessary.
8. Disconnect from BITF and connect to McMurdo Transmitter Facility (T-Site) via the TCS.
9. Type the equipment address of the transmitter to reprogram. Press TAB twice to access the main section.
10. Follow Steps 4 and 5 to reprogram the main transmitter.
11. Repeat Steps 8 through 10 for the simulcast transmitter, if necessary. The work and guard receivers and the transmitter are now changed to the new frequency. The TCS will report the new frequency on all equipment, regardless of what button appears to be selected on the touch screen.

Note Only Mac Center's air traffic control frequency groups have a simulcast transmitter.

12. Reset the frequency group by pressing the work frequency button on the touch screen.
13. Disconnect the TCS from McMurdo Transmitter Facility (T-Site).

Appendix 5: Local (Harris) Receiver Operations

This section details Harris R-2368 receiver operations, settings and programming.

Ten Harris R-2368 HF receivers, referred to as "local" receivers, supplement and back up McMurdo Station's primary HF receivers at BITF. The receivers are patched to the Arrival Heights antenna array via the SME 2500 video-switch matrix (hereafter referred to as the "antenna matrix"). The Harris receivers back up primary circuits in the event primary receive signals from Black Island are lost. The Harris receivers also expand operational flexibility by allowing Communications Technicians to tune up alternate frequencies, fine tune signals using directional antennas, and troubleshoot equipment.

Front Panel Overview

Following is a list of standard settings for daily use of the receivers in Mac Ops. For detailed instructions on these and other receiver settings and keys, reference the R-2368/URR Radio Receiver Instruction Manual in the Room 210 (Mac Ops Remote) library.

- Audio Frequency (AF) Gain/Power knob turns the receiver On and Off and sets the audio gain control. Set AF Gain to desired volume.
- RF Gain knob sets the radio frequency gain. Set at desired level.
- Automatic Gain Control (AGC) adjusts the receiver's gain to limit noise output. AGC can be set to four different speeds: DAT, FST, MED or SLO. DAT is used for RTTY, and MED or SLO for voice communications.
- RCV button sets the receiver in receive mode and should be activated for normal operations.
- PROG button sets the receiver in program mode.
- SCAN button sets the receiver in scan mode.
- Frequency (kHz) button sets the frequency display cursor at the first digit for keypad input.
- Tune Rate Key sets the frequency display cursor at the desired digit for keypad input.
- Tune Key activates the frequency-tuning wheel. The tune key should be turned off to prevent accidental frequency changes.

Change Frequencies

1. Press the TUNE RATE key until the cursor is at the desired digit, or press the FREQUENCY key.
2. Input the frequency using the keypad. Numbers appear from the cursor point forward.

Note Enter a zero before frequencies below 10,000 kHz. The first digit on the frequency display will not accept values greater than 2.

3. Press ENTER to set the frequency.

4. When the LED between the tune wheel and TUNE button is lit, the tune wheel is activated. Even a slight bump on the tune wheel will change the frequency. To disable the tune wheel, press the TUNE button once.
5. Verify the frequency and perform radio checks to verify the frequency is operational.

Program the Harris Receivers

The Harris R-2368 receivers can be programmed with channels and groups. Reference the Harris Receiver Channel List in the *Information Guide* located under the Frequency Information tab. Once programmed, the receivers can be set to scan a set of channels, or a particular group.

Program Channels

1. Press the PROG key, illuminating the green lights above the key and to the right of the channel button.
2. Type the channel number to program. (Enter a zero before single digits.)
3. Press FREQUENCY, illuminating the green light adjacent to the key.
4. Enter the frequency to be assigned to the channel.
5. Verify decimals and spacing. For example, frequency 7338 kHz should be entered as 07338.000
6. Press LOAD.
7. Follow Steps 2 through 7 for each channel to program.
8. To verify the channels, press RCV, then CHANNEL. Type the channel number and press ENTER to display the channel's frequency.

Program Groups

It is possible to program the Harris receivers with groups of channels. However, channels must be programmed before groups.

1. Press the PROG key, illuminating the green light above the key.
2. Press GROUP. The LED prompts Group number?
3. Enter the group number to program. (Enter a zero before single digits.)
4. Press LOAD.
5. Enter the first channel in the group.
6. Press ENTER, then LOAD.
7. Repeat Steps 5 and 6 for each channel in the group.
8. Repeat Steps 2 through 7 for each group to program.

Verify Programmed Groups

Verify Groups programmed to the receiver by following the steps below.

1. Press SCAN, then GROUP.
2. Type the group number and press ENTER. On receivers 6, 8 and 10, press ENTER again. The LED will scan the channels and frequencies assigned to the group. If the scan is too fast, press DWELL.

Harris Receiver Default Frequency

It's possible to program the Harris receivers with a default frequency. Pressing RECALL sets the receiver on the default frequency. To set the default, follow the steps below.

1. Press RCV.
2. Press FREQUENCY.
3. Enter the desired frequency.
4. Press ENTER.
5. Press LOAD.
6. To verify the default frequency, press RECALL.

Scanning

Each Harris Receiver is programmed with 82 preset channels (or frequencies). The channel numbers and frequencies match those programmed on the RT-7000. It is possible to program the receivers to scan several channels or preprogrammed group of channels.

Scan Group

When scanning a group of channels, the receiver pauses on each channel in the group for the duration of a pre-set dwell time, regardless of whether or not the channel is picking up a signal. R-2368/URR model receivers may be programmed to stop automatically at a frequency when a signal is detected – or to scan continuously, pausing only for the duration of the preset dwell time.

1. Press SCAN. The Scan light illuminates and the receiver prompts: `Group or Channel Scan?` If the receiver is already in scan mode, press RCV, then SCAN.
2. Press GROUP. The receiver prompts: `Group Number?`
3. Use the keypad to enter the single-digit preprogrammed group number (1-7).
4. Press ENTER. The R-2368 model receivers begin scanning.

Note Pressing SCAN toggles the scan On and Off. Pressing RCV or TUNE stops the scan.

5. On R-2368/URR model receivers, the receiver displays: `Auto Stop Scan`. Press the BFO key to select On/Off and press ENTER. Selecting On enables the receiver to pause on a frequency once detecting a signal.
6. If Off is selected, the receiver starts scanning. If On is selected, the screen displays Stop Threshold.
7. Enter a number from 01-99. (The higher the number, the less sensitive the receiver is to a signal.) Set the stop threshold between 10 and 50 for best results.
8. Press ENTER. The receiver begins scanning.

Channel Scan

The Harris channel scan scans a block of preprogrammed channels.

1. Press SCAN, illuminating the LED light. The screen displays: `Group or channel scan?`
2. Press CHANNEL. The screen displays: `First Channel?`
3. Enter the double-digit channel number of the lowest channel in the block of frequencies to scan.
4. Press ENTER. The screen displays: `Last Channel?`
5. Enter the double-digit channel number of the highest channel in the block of frequencies to scan.
6. Press ENTER. Scanning begins.

Unselect Scan

1. Press RCV.
2. Press TUNE. Unselect the Tune key to prevent an accidental change in the programmed frequency

Harris Receiver Backup

Mac Ops has the ability to backup failed BITF receive signals by means of the local Harris receivers.

Nineteen receivers at BITF provide McMurdo Station's primary HF receive signals, sent to McMurdo Station via microwave radio. The multiplexer that converts the microwave signal into separate HF signals can fail. The multiplexer is located in the Telecommunications work center. Telecommunications personnel can troubleshoot and correct the failure, but Mac Ops must backup the BITF HF work receivers with the local Harris receivers until primary HF receive signals are restored. The Communications Technician uses patch cords at the primary patch panel to route receive signals from Harris receiver equipment to the work channels in frequency groups.

Back Up Work Receivers

To back-up the work receivers, Communications Technicians:

1. Call Mac Center and request the primary and secondary flight-following frequencies. Verify if Mac Center is using HF for helicopter-related flight-following and will require the helicopter flight-following frequency to be backed up. Mac Center has the prerogative to command use of the RT-7000 from its remote head in Mac Center. It is important that Mac Ops not use the RT-7000 until Mac Center releases it.
2. Verify Mac Ops working frequencies.
3. Advise Mac Center and Mac Ops operator that the work centers still have the ability to transmit.
4. Patch the line jack for local receivers to the drop jack of the work receiver in each group, as follows:
    - Verify Harris Receiver 3 is tuned to the primary flight-following frequency. Patch Mac Center ATC Primary Work to Rx 3.
    - Verify Harris Receiver 6 is tuned to the secondary flight-following frequency. Patch Mac Center ATC Primary Guard to Rx 6.
    - If needed, verify Harris Receiver 9 is tuned to the helicopter flight-following frequency. If needed, patch Mac Center Helo Flight-Following Work to Rx 9.
    - Verify Harris Receiver 1 is tuned to 7995. Patch Mac Ops 1 Work to Rx 1.
    - Verify Harris Receiver 2 is tuned to 11553. Patch Mac Ops 3 Work to Rx 2.
    - Verify Harris Receiver 4 is tuned to 4770. Patch Mac Ops 2 Work to Rx 4.
    - Verify Harris Receiver 5 is tuned to the primary ship-to-shore frequency. Patch Mac Ops 5 Work to Rx 5.
    - Verify Harris Receiver 7 is tuned to the secondary ship-to-shore frequency. Patch Mac Ops 4 Work to Rx 7.
5. Verify the local receivers are placed on the appropriate directional antennas.
6. Advise Mac Center that receive capability is restored, and that both work centers should take care not to change the work frequency selection until further notified.
7. Conduct radio checks beginning with Mac Center, followed by Mac Ops.

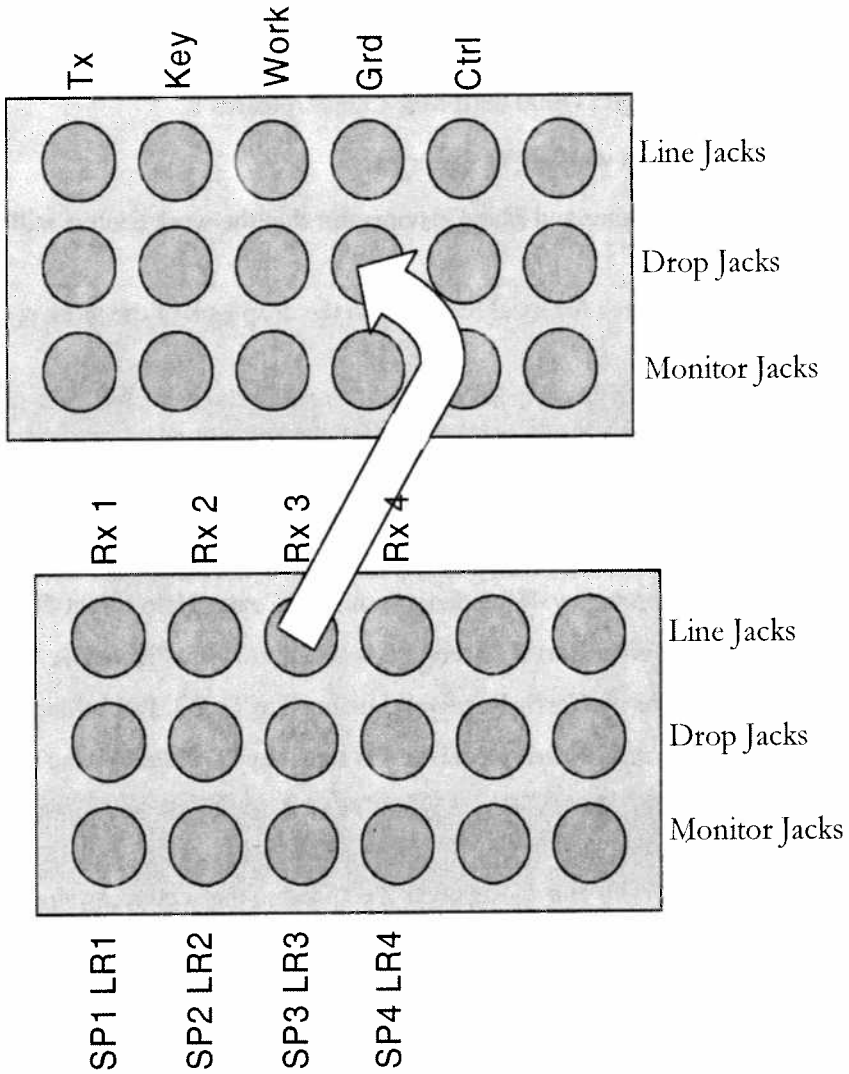

Figure 1: ATC Primary Patched to Receiver 3

Once all groups are patched to local receivers and radio checks are complete, page the supervisor. Call or page the Senior Telecommunications Technician and report a possible failure at the multiplexer. Notify the BITF Communications Technician of the failure.

If anticipating an extended outage, improve the reception on the local receivers by checking different antennas for the optimum signal. If feasible, request that South Pole Station perform a long test count, while switching antennas at the antenna matrix.

Phone patch equipment may require internal audio adjustments to correctly function with the local receiver signals. If anticipating an extended outage, also call or page the Communications Technician (Field Party Comms Shop) to adjust the JPS radio-telephone interface units.

Related References

Harris R-2368/URR Radio Receiver Instruction Manual

Appendix 6: Noise Reduction Unit

Mac Ops incorporates four JPS NRU-500 noise-reduction units to process receive signals from Harris local receivers 1 through 4. The Noise Reduction Unit (NRU) unit enhances the intelligibility of noisy signals by processing the receive signal through noise reduction circuits. An added benefit is the reduction of white noise fatigue to operators.

Settings (in bold font) for normal operation:

- Power: On (red LED light)
- Noise Reduction: Med
- On/Bypass: **On**
- Squelch/Off: **Squelch**
- Speaker/Off: **Speaker**
- Monitor: Adjusts headphones volume, if headsets are installed on NRU.

These circuits may be bypassed by setting the Noise Reduction On/Bypass switch to Bypass. In Bypass mode, the audio signal is heard as it is received, with no filtering. Setting the switch to On routes the audio signal through noise-reduction circuits. These circuits process the audio (causing a quarter-second delay in the audio reaching the speaker) with three levels of noise reduction.

- MIN provides a small amount of "white noise" (hiss) reduction.
- MED and MAX provide increasing amounts of noise reduction.

Under weak receive-signal conditions, the Max setting will actually remove portions of the audio signal along with the background noise. Avoid this setting during degraded propagation conditions.

When Squelch is enabled, low-level background noise is suppressed until a strong voice signal is present. This allows the operator to monitor frequencies with less fatigue due to white noise. However, it may result in some loss of weak signals and short duration transmissions.

The green Signal light should flash occasionally when a signal can be heard with the squelch disabled and Noise Reduction set to Bypass. When squelch is enabled, it indicates the squelch circuit has detected a signal and will remain on until the signal is gone.

If no noise or signals are heard on a particular frequency when the operator believes there should be sound, change the settings to the following:

1. Set Squelch to Off.
2. Set Noise Reduction to Bypass.

Appendix 7: Spectrum Analyzer

Mac Ops uses the spectrum analyzer to troubleshoot circuit problems, check the operational status of the Arrival Heights antenna array, and to monitor HF propagation conditions.

Discussion

Spectrum analyzers provide graphic displays of specific ranges of the electromagnetic spectrum and are primarily used as test equipment by communications technicians, but are also helpful tools for operators. Having a basic knowledge of radio and HF propagation theory aids in understanding how the spectrum analyzer operates and the information it displays.

Spikes on the spectrum analyzer display represent signals received by the antenna currently connected to the spectrum analyzer. The height of the spike increases with the strength of the signal (amplitude) measured in decibels (dB.) Frequency increases from left to right.

Mac Ops is equipped with a Hewlett Packard 8591E 9kHz-1.8GHz spectrum analyzer, installed in cabinet #2. Input signals from the Arrival Heights antennas are connected to the spectrum analyzer through an Aiken Advanced Systems SME-2500 series video switch matrix, hereafter referred to as the antenna matrix.

This section briefly outlines the key applications of the spectrum analyzer for the operators. The *HP 8590D Users Guide* summarizes all of the features of the unit. The *HP 8590D Users Guide* and a Quick Reference Guide for the spectrum analyzer are located in the Room 210 (Mac Ops Remote) library.

Spectrum Analyzer Uses

The spectrum analyzer is used to view the HF spectrum or to focus more closely on a specific band or frequency within the spectrum. It is also used to troubleshoot transmit circuits and problems with the Arrival Heights antenna array. When using the spectrum analyzer, verify that the desired antenna is connected to the spectrum analyzer. Only one antenna can be input to the spectrum analyzer at one time – the HF spectrum displayed is the spectrum as received by the current input antenna. Use the antenna matrix to change the antenna connected to the spectrum analyzer. Consult the guide topic Antenna Matrix Operations for instructions.

Propagation Conditions

Given an antenna that operates normally, the spectrum analyzer is a good barometer of general HF propagation conditions. When propagation conditions are normal, the spectrum analyzer will reveal a variety of spikes across the spectrum. Enhanced propagation is normally seen as a noisy spectrum, characterized by very tall spikes across the spectrum. When propagation is enhanced, an increased number of signals from around the globe can propagate to the Antarctic and received signals may be of greater than normal amplitude. During periods of enhanced propagation, interference from other stations often increases.

Note At night, the spectrum tends to become much noisier than during daylight hours and this increase is visible on the spectrum analyzer.

When propagation degrades and certain wavelengths of the HF spectrum are suppressed, the suppression is visible on the spectrum analyzer in the form of very few or no spikes in that part of the spectrum. Polar-cap absorption, characterized by a suppression of lower frequencies, is visible as a lack of spikes in the lower spectrum. During severe Polar Cap Absorption (PCA) events, all frequencies will be absorbed and the spectrum analyzer will display no spikes. As polar absorption wanes, higher frequencies will recover first and spikes will begin to gradually reappear in the upper spectrum.

During periods of geomagnetic activity, higher frequencies become suppressed as the ionosphere gradually loses its ability to refract them. Depending on the severity of the activity, the spectrum analyzer will indicate very few or no spikes in the upper spectrum. As geomagnetic activity wanes, spikes will gradually reappear, with the highest frequencies recovering last.

The antenna connected to the spectrum analyzer can also affect how signal activity appears. Because the Arrival Heights antennas are directional, when a different antenna is connected to the spectrum analyzer, the HF spectrum is being 'viewed' from a different angle. The spectrum can appear markedly different simply as a result of antenna direction.

View the HF Spectrum (3-30 MHz)

To program the spectrum analyzer to view the HF spectrum, follow the steps below.

1. Press the FREQUENCY key, highlighting Center Frequency on the upper right-hand corner of the screen.
2. Enter 11553 on the keypad and press the KHZ key. This sets the center of the frequency range to view at 11.55 MHz.
3. Press the SPAN key, highlighting Span on the upper right-hand corner of the screen.
4. Type **20** on the keypad and press the MHz key, setting the span of the range to view to 20 MHz.

To scroll through the spectrum with the diamond-shaped cursor on the display, press the MKR key, highlighting Marker Normal at the top, right corner of the screen. This allows scrolling through the spectrum with the dial to the right of the screen. The "Marker" readout in the center, left side of the screen displays the frequency at which the marker is currently placed.

To focus on a particular frequency or band, shorten the width of the span to 5 or 10 MHz and set the center frequency to the desired frequency. This results in a much more detailed view of HF spectrum activity around a particular frequency. While in this mode, pressing the MKR key allows for scrolling up and down the spectrum, with the span tightly focused on the center frequency.

Interference

Use the spectrum analyzer to pinpoint interference. Generalized sources of interference, such as machinery or arc welding, are often seen on the spectrum analyzer as erratic spikes cycling across the spectrum, or as the amplitude floor lifting erratically across the spectrum. A source of specific interference (for example, another station transmitting near a frequency) is found by focusing in on the frequency experiencing the interference. To determine the source, tune in on the spikes around that frequency.

Bleed-over occurs when a transmit antenna transmits a signal on a frequency or frequencies to which the transmitter is not tuned. Bleed-over is caused by problems with the transmit antenna and/or pieces of conducting debris within or near the antenna field. Bleed-over is visible on the spectrum analyzer as a lift in the amplitude floor, or large harmonic spikes up and down the spectrum surrounding the transmitter's frequency when the transmitter is keyed. Bleed-over is possible between the bands. For example, an HF transmitter can bleed interference into the VHF and UHF bands.

Troubleshoot Transmit Circuits

When keying a handset, a signal spike should appear on the spectrum analyzer at the radio or circuit's frequency. If a handset is keyed and a corresponding spike does not appear on the screen (and no audio is heard), there may be a problem with the transmit circuit. If a radio check shows a signal spike, again with no audio, the transmitter is keying, but there may be an audio line problem.

Troubleshoot the Arrival Heights Antenna Array

The spectrum analyzer is a useful tool for checking the operational status of the Arrival Heights antenna array. If propagation conditions are normal, a flat line with no spikes on the display may indicate that the input antenna is not functioning.

The Arrival Heights antenna array is connected to the TCS technical panel via ten cables that run from the antennas to the back wall of the TCS and into the antenna junction box in the far corner. Gravity and wind have increasingly degraded the cables through time and many cables are spliced. During periods of high wind, it is not uncommon for the splices to "short," causing erratic spiking on the spectrum analyzer, and audible as bursts of loud static on the local receiver. Always check the operational status of each antenna after a storm. If shorting does not subside after winds have calmed, the cable may require re-splicing.

Contact a Communications Technician for any suspected problem involving the array.

Related References

HP 8590D and E Series Spectrum Analyzer Users Guide

Quick Reference Guide HP 8590D and E Series Spectrum Analyzer

SME-2500C-0001 Video Switch Matrix Operators Manual

Antenna Matrix Operations section of this guide

Appendix 8: Antenna Matrix Operations

This section details use of the Aiken Advanced Systems SME-2500 Series video-switch matrix.

The antenna matrix connects the Arrival Heights directional antenna signals to the 10 local Harris receivers and the spectrum analyzer.

Discussion

The SME-2500C Video Switch Matrix (hereafter referred to as the "antenna matrix") allows the operator to connect the receive signals of the Arrival Heights antenna array to the 10 local receivers and the spectrum analyzer in Room 210 (Mac Ops Remote).

The Arrival Heights antenna array consists of an eight-leg loop array (referred to as a "rosette"), a unidirectional loop antenna, and a dipole antenna. The antenna array is connected to the antenna matrix via 10 cables running from the Arrival Heights array into the antenna junction box at the south corner of Room 210 (Mac Ops Remote).

As mentioned above, cables have a tendency to "short" during high winds and storms. Always check the operational status of each antenna after a storm.

If all 10 antennas appear not to function, check the fuse on the bottom, right side of the antenna junction box. To remove the fuse, push up and turn left. Replacement fuses are stored inside the junction box. To re-install the fuse, push up and turn right.

Matrix Configuration

The antennas labeled 1 through 10 are routed to the inputs of the Antenna Matrix and continue to the 10 Harris receivers or the Spectrum Analyzer. Using the matrix, any antenna in the array can be connected to any local receiver or the Spectrum Analyzer.

A map of the antennas with respective assigned numbers and directional coordinates (below) is affixed to the cabinet below the spectrum analyzer. An input/output configuration list for the matrix is also posted on the cabinet below the spectrum analyzer. The numbers of the Harris receivers, the spectrum analyzer, and the antennas all correspond to the inputs and outputs programmed into the antenna matrix.

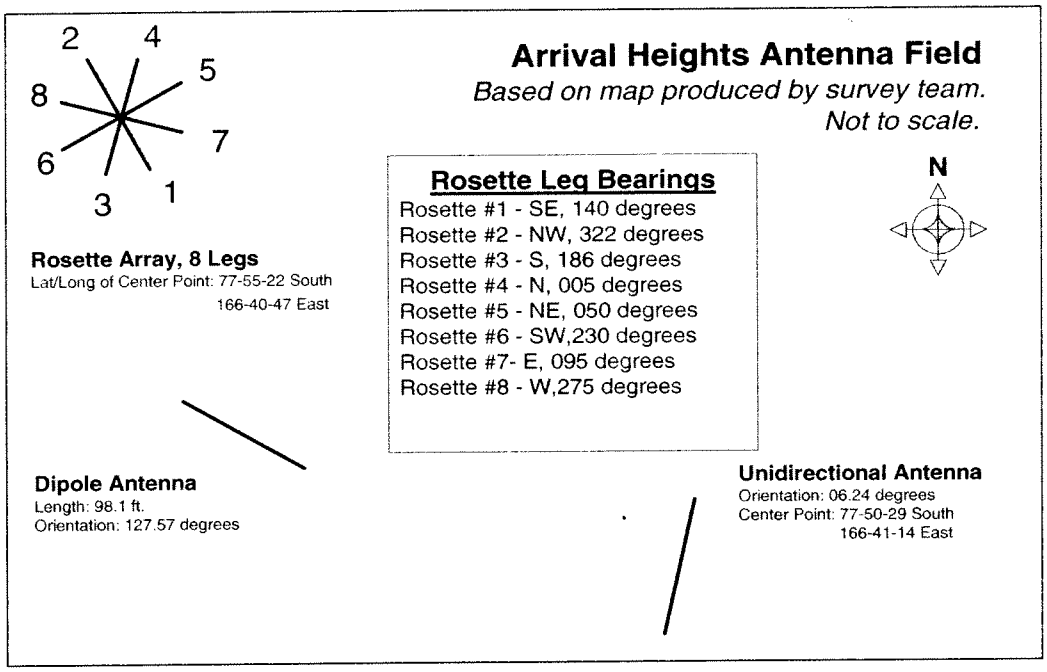

Figure 2: Arrival Heights Antenna Field

Connect Inputs to Outputs

On the antenna matrix display, outputs (receivers, spectrum analyzer) are listed on the right side of the screen, inputs (antennas) on the left side of the screen. A pair of brackets denotes the active field.

To connect a receiver or the spectrum analyzer to an antenna:

1. Using the left or right arrow keys on the keypad, move the brackets to the output field and type the number of the output to change. Alternately, move the brackets to the output field and use the up and down arrow keys to scroll to the desired output.
2. Using the left arrow key on the keypad, move the brackets to the input field and type in the desired input number.
3. Press ENTER.

Related References

SME-2600C-0001 Video Switch Matrix Operators Manual

Spectrum Analyzer section of this guide

Glossary

Use the following definitions when reading these policies and procedures:

AF
Audio Frequency

Air Ops
Air Operations, also known as Fixed-Wing, Building 165, McMurdo Station

AFTAC
Air Force Technical Applications Center

AGC
Automatic Gain Control

ANG
Air National Guard
New York USAF National Guard is a primary subcontractor providing air logistics.

AOL
America On-Line, an Internet Service Provider

AOPB
Air Operations Planning Board

APA
Advanced Passenger Advisory

ATA
Actual Time of Arrival

ATC
Air Traffic Control

ATD
Actual Time of Departure

ATO
Antarctic Terminal Operations

ATR
Actual Time of Return

ATS
Aviation Technical Services — subcontractor providing meteorological and Air Traffic Control support to the USAP at McMurdo. As of 2005, the organization is referred to as SOPP.

BFC
Berg Field Center, Bldg 160 at McMurdo Station – field camp training and equipment staging center at McMurdo Station

BITF
Black Island Telecommunications Facility

Chalet
Building 167 at McMurdo Station – houses the offices of McMurdo NSF Representative and RPSC Area Director.

Comms Shop
RPSC Communications work center, Building 159, that maintains, issues and repairs radio-asset inventory

COSPAS-SARSAT
Abbreviation of the Russian words "Cosmicheskaya Sistyema Poiska Avariynich Sudov," (meaning Space System for the Search of Vessels in Distress International Satellite System for Search and Rescue) and the American words "Search And Rescue Satellite."

Crary Laboratory
Building 1 at McMurdo Station – houses science laboratories and offices

dB
Symbol for Decibels – a logarithmic unit of measure in a scale; frequently used to compare sound pressure or electronic signal strength.

DCI
Daily Check-In – the time at which a field party is scheduled to contact Mac Ops each day, to acknowledge that all is well in the camp.

DID
Direct International Dialing. Designates a line for incoming off-continent calls.

DISA
Defense Information Systems Agency - the Information Technology (IT) organization for the United States Department of Defense

DOD
The United States Department of Defense

EAS
Expeditionary Airlift Squadron – an Air National Guard detachment formed to support Antarctic personnel and cargo airlift operations

ELT
Emergency Locator Transmitter – an automated, aircraft-mounted device that emits a coded radio signal indicating the location of an aircraft in distress.

EMSS
Enhanced Mobile Satellite Service – an Iridium satellite-based communication system operated by Defense Information Systems Agency (DISA), the Information Technology (IT) organization for the United States Department of Defense.

EOC
Emergency Operations Center

EPIRB
Emergency Position Indicating Rescue Beacon - an automated, maritime device that emits a coded radio signal indicating the identity and location of a vessel in distress.

ETA
Estimated Time of Arrival

ETD

Estimated Time of Departure

ETR

Estimated Time of Return

FAX

Facsimile Transmission - A process of converting optical images into electrical signals for transmission over communication systems (phone line, internet etc). When the electrical signal is received, it is converted back to an optical format for display or printing of the original image.

Field Party (FP)

Science group or science-support group traveling away from McMurdo Station by vehicle or aircraft

Field Party Call Sign

Voice call sign that identifies a particular science, technical, or writer/artist group, or a vehicle number or name. That call sign originates from the event number of the respective field party (for example, B-004 is Bravo Zero Zero Four).

FP Ops

Field Party Operations – the activities of scientific groups deployed to remote locations in Antarctica.

FTP

File Transfer Protocol - A communications protocol governing the transfer of files from one computer to another over a network.

GA

General Assistant – the employees that provide miscellaneous manual labor at McMurdo station

Gain

Measure of signal amplification, in decibels

GHz

Gigahertz, a measure of cyclic frequency – 1 GHz equals one billion cycles per second

GMT (Greenwich Mean Time)

The mean, solar time of the meridian of Greenwich, England; used as the prime basis of standard time throughout the world. Often used to refer Coordinated Universal Time (UTC) when viewed as a time zone.

GPS

Global Positioning System – a network that uses time-based radio signals, from a constellation of orbiting satellites, to accurately determine the position of the receiver anywhere on or above the earth's surface

Grantee

An individual or group performing scientific or art-related activities in Antarctica, under the auspices of the National Science Foundation

Helo

Slang abbreviation for helicopter

Helo Ops

Helicopter Operations – located in the Helo Hangar, Building 129 at McMurdo Station

Herc
Slang abbreviation for "*Hercules*" the model-name of the Lockheed Martin C-130 (and ski-equipped LC-130) cargo aircraft used in Antarctica

Hit
A positive contact or indication – as used with the COSPAS-SARSAT system, an indication that an emergency signal has been detected in the vicinity of the Antarctic Continent

HF
High Frequency – the band of radio frequencies from 3 to 30 Megahertz (MHz)

I-Net
Abbreviation of "Industrial Network" – the VHF communications channel used for construction, maintenance, shuttle dispatch, and numerous other functions at McMurdo Station

IP Phone
Internet Protocol telephone

IPS
Ionospheric Prediction Services: Australian Space Weather Agency, a governmental organization that specializes in disseminating HF propagation and space weather information

Iridium
A satellite-based, world-wide telephone system

IT
Information Technology – the RPSC division responsible for computer and communications equipment and operations

JASART
Joint Antarctic Search and Rescue Team, includes the USAP Primary SAR Team and SAR Team members from ANZ (Antarctica New Zealand) at Scott Base.

LAN
Local Area Network

LED
Light Emitting Diode

LEO
Low Earth Orbit – Satellite orbital track with Apogee (High Point) and Perigee (Low Point) between 100 and 1,500 kilometers (62-932 miles) above the earth

LLC
Limited Liability Corporation

LUT
Local user terminal

Mac Center
SOPP Air Traffic Control (ATC) facility, Building 165

Mac Log
A written record that details the telecommunications events, Mac Ops operator's response and related tasking

Mac Notes

A written log that documents event details, observations, questions, procedural changes and other general information pertinent to the work center operations

Mac Ops

Radio call sign for McMurdo Communications Operations Center, building 165

Mac Weather

Radio call sign for meteorological service provider at McMurdo Station, building 165

Mario Zuchelli Station

Italian Antarctic Research Station located on the continent at Terra Nova Bay.

Mattrack

Brand name for a track-system used to adapt light trucks for operation over snow surfaces.

MCC

Movement Control Center – the Logistics function responsible for intercontinental and intra-continental personnel and cargo movement

MEC

Mechanical Equipment Center – Building 58 at McMurdo Station – small engine and mechanical equipment servicing center for science field party equipment

MeV

Million Electron Volts – a measure of electrical energy potential

MHz

Megahertz, a measure of cyclic frequency – 1 MHz equals one million cycles per second.

NRU

Noise Reduction Unit

NSF

National Science Foundation

NOAA

National Oceanographic and Atmospheric Agency – a division of the United States Department of Commerce

NodeMux

Node Multiplexer – a device that connects two or more radio networks

PCA

Polar Cap Absorption – a phenomenon that degrades radio wave propagation

PE

Position Electronics

PHI

Petroleum Helicopters Inc. – a private company that contracts directly to the NSF, providing rotary-winged aircraft for field support and transportation. Operates primarily from McMurdo Station.

Phone Patch

Voice-activated interface between radio frequencies and telephone user

PIN
Personal Identification Number

Pisten Bully
Brand name of a tracked vehicle used for transportation on snow and ice

PLB
Personal Locator Beacon - an automated device, carried on land, that when activated, emits a coded radio signal indicating the identity and location of a party in distress

POB
Persons On-Board – the number of individuals aboard a vehicle (aircraft, ship, bus, van, etc) or in a field camp

POC
Point of Contact

Raven Ops
139th Expeditionary Airlift Squadron, Air National Guard LC-130 Operations, Building 165

RCC
Rescue Coordination Center

RCOMM
Radio Control, Operation, Maintenance and Management

Retro
Retrograde – the act of shipping excess or obsolete material out of Antarctica for disposal

RF
Radio Frequency

RPSC
Raytheon Polar Services Company

RTTY
Non-voice radio communications (originally an acronym for Radio Teletype)

RTU
Radio Telephone interface Unit

Rx
Receive

Sailor Line
An interface device that connects conventional telephones at McMurdo Station to the Iridium satellite-based, world-wide telephone system

SAR
Search and Rescue

SAR Alert Phase
When the Alert Phase is declared by the EOC, additional notifications are made and the SAR Call-Out page is sent, as outlined in the SAR Notification Checklist.

SAR Call-Out
During the Alert Phase, a SAR Call-Out page is sent to notify the JASART members and other appropriate personnel.

SAR Notification Checklist
This document contains updated contact information for various SAR phases.

SARMC
Search and Rescue Mission Coordinator

SARSAT
Search and Rescue Satellite

SAR Uncertainty Phase
Activity phase that begins with notification to SARMC that a field party or vehicle is overdue for scheduled check-in

Sched

Slang abbreviation for schedule

Scott Base
New Zealand Antarctic research station, located on Ross Island

SEC
Space Environment Center

Shakedown
A short-duration, pre-deployment test of new equipment to determine its functionality

SIM
Subscriber Identity Module – the card or chip in a device (such as an Iridium phone) which identifies the authorized user.

Simplex
Descriptive term for a radio system that does not use radio repeaters

SFA
Support Forces Antarctica – command staff responsible for Department of Defense and U.S. Coast Guard support of USAP

Skier

Refers to an LC-130 or Herc. Generally used in conjunction with an event or tail number. For example, "Skier 42 departed McMurdo at..."

Skier Maintenance
Radio Call Sign for the New York Air National Guard's Maintenance Control Facility at McMurdo Station

SMS Daemon
Short Messaging Service Daemon – a daemon (pronounced DEE-muhn) is a program that runs continuously and exists for the purpose of handling periodic service requests that a computer system expects to receive.

SOPP
SPAWAR Office of Polar Programs. Subcontractor providing meteorological and Air Traffic Control support to the USAP at McMurdo.

SPAWAR
Space and Naval Warfare Systems Center

SWF
Short-Wave Fadeout – a phenomenon that results in reduced propagation of HF radio signals

T-Index
Indicator of the effect of solar activity on the ionosphere

T-Site
Transmitter Site – an area reserved for radio communications antennas and equipment, located on the hills above McMurdo Station

Tail Number
Aircraft Registration number - normally displayed on the vertical stabilizer ("tail") of military aircraft.

TCS
Technical Control Station

TED
Acronym for Touch Entry Display

Telco
McMurdo IT personnel responsible for telephone communications equipment

Tx
Transmit

UHF
Ultra-High Frequency – the radio frequency band between 300 Million Hertz (300 MHz) and 3 Billion Hertz (3 GHz)

Uncertainty Phase Page
Pager message to alert key SAR personnel that routine check-in by a field camp or vehicle is overdue.

UPS
Uninterruptible Power Supply

US
The United States of America

USAP
United States Antarctic Program

USB
Upper Sideband

USCG
United States Coast Guard

USCGC
United States Coast Guard Cutter

USES
Unattended Satellite Earth Station – the primary communication system between McMurdo Station and the rest of the world.

USMCC

United States Mission Control Center – operations and notification Center for the COSPAS-SARSAT system

UTC (Coordinated Universal Time)

International standard of time, as kept by atomic clocks worldwide. Also known as "Zulu" time (Z).

VCCR

Voice Communications Control and Routing

VHF

Very High Frequency – the band of radio frequencies extending from 30 to 300 Megahertz (MHz)

VOIP

Voice Over Internet Protocol. Refers to the technology used for all off-continent phone calls and faxes. Phone/fax lines are run through the broadband Internet connection.

Vostok

Russian Antarctic research station located atop Lake Vostok, on the Antarctic Plateau

Winfly

Winter Fly-in – deployment of personnel and supplies in August, after first sunrise and prior to main-body season

Wx

Weather

Z

Zulu Time – A military term for Coordinated Universal (or UTC) Time.