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SUPPORT RADIO COMMUNICATION DURING XVII ANTARCTIC EXPEDITION

P. Kundu
DEAL, Dehradun

Abstract

During the summer of the XVII expedition, the author along his team members successfully commissioned an INMARSAT A and a M terminal, installed e-mail and INTERNET facility, a VHF Repeater and a HF Log Periodic Antenna at Maitri that were of great use.

Introduction

The XVII Indian Scientific Expedition to Antarctica, under the leadership of Mr.K. R. Sivan sailed off from Goa on 8th Dec. 1997. The expedition team was comprised of 50 members from various organisations. Defence Electronnics Applications Laboratory (DEAL), Dehradun was entrusted with the responsibility of providing total communication support to the entire expedition.

The Ship MV Polarbird, which was chartered for the expedition reached the Antarctica coast on 2nd Jan. 1998. Helicopter operations were started immediately to shift both men and equipment to the Indian Antarctic Base, MAITRI. The expedition leader projected the requirement of maintaining regular communication between the ship and MAITRI: It was therefore decided that one communication person would man the radio station on-board the ship while two persons will shift to the MAITRI station. Subsequently on-board communication person was replaced by one of the members of wintering over DEAL team. All the assigned communication tasks were carried out successfully and the summer camp was formally closed on 25th Feb. 1998.

1. Commissioning of INMARSAT-A terminal

Indian Antarctic Base, MAITRI is connected with rest of the world through telephone, fax and telex via INMARSAT satellite. This time one INMARSAT-A satellite terminal (Magnavox MX2400) has been commissioned for e-mail and INTERNET connectivity. The terminal has been installed at GIRNAR hut (e-mail hut). One MTI INMARSAT-A terminal is already mounted there, which was damaged during last wintering and could not be repaired due lack of spare parts. Instead of dismanting MTI antena dome, the new Magnavox antenna dome is mounted in front of the GIRNAR hut. Considering the high wind speed and snow hazard aspects, one rigid metallic platform has been made for the dome.

The Magnavox satellite terminal has been directed to point Indian Ocean Region INMARSAT satellite (00873). The ID number of the terminal are given below :

Primary : 1641212
Secondary : 1641213

2. Commissioning of portable satellite terminal for field camps and convoy

Since beginning of Indian Antarctic Expedition one of the challenging jobs is to provide a reliable communication link to the remotely placed field camp. Due to lack of line of sight (LOS) and long distance, it is not possible to connect some field camps with main station through VHF link. Again HF communication link depends on geomagnetic conditions and solar cycles. Hence for safety sake of the remotely placed camp, HF link can not be the only communication medium. In XVII IAE, reliable satellite communication facilities have been introduced to the field camp and convoy.

The OMNIPHONE protable satellite communication terminal for INMARSAT-M has voice and data transmission facilities. With this lightweight briefcase model of satellite terminal the GSI camp at Humboldt, which is 120 km away from MAITRI was always connected to not only main station but also rest of the world. This has given moral boosting and security feelings to the isolated

expedition members.

The same terminal has been effectively used during convoy movement also. Due to portability and various provisions for power supply, this terminal is very much useful at camp site as well as convoy. It can be used for emergency communication to get connected Antarctica with rest of the world. The terminal can be set to lock with Indian Ocean Region (00873) or East Atlantic Ocean Region (00871) satellite depending on the location of terminal. The four ID numbers of the OMNIPHONE terminal are given below :

Tel	-.	684040246	Fax	:	684040247
Data	:	684040248	PABX	:	684040249

3. Establishment of E-mail / INTERNET Connectivity

In the present information era, Antarctica can not be isolated. Now Indian Antarctic base is up to date with all latest information through World Wide Web sites. MAITRI has got e-mail and INTERNET account through VSNL gateway. THE DEAL communication team in XVII IAE has established e-mail and INTERNET connectivity at MAITRI on 15th Jan. 1998.

With INTERNET facilities, now any expedition member who is isolated for year long can access to the latest information and data of scientific development in their respective fields from through out the world. Even member can exchange their views with experts from any part of the world.

The e-mail facility has given a very efficient and cost effective communication link between MAITRI and rest of the world. Regular technical reports and scientific data are being sent from MAITRI to various parent organisations through e-mail. This facility also acts as a moral booster by exchanging personal letters among isolated expedition members and their relatives.

Unlike in India, at Antarctica for e-mail and INTERNET connectivity, very expensive satellite time is to be used. Considering this point, satellite connection with VSNL, Delhi tor e-mail has

only been established during the off-peak time of INMARSAT usage hour (1900GMT to 0500GMT). During summer regularly on average 22 e-mails were sent and received.

HF and VHF Communication

During the onward journey from India to Antarctica, regular HF contacts was maintained with DEAL and MAITRI from the ship radio room. Messages for anticipated logistic support and other information were regularly exchanged.

From MAITRI regular HF contact was made with DEAL. The GSI field camp at Humboldt mountain range, which 100km away from MAITRI was also supported by HF communication link.

In VHF communication, regular support was given to near by field camp and helicopters. This time Motorola GP300 handheld transceivers were introduced. This lightweight, small transceivers were found very effective up to 7-8 km. Near by JU camp was in touch MAITRI even during their fieldwork also through this handheld set. During convoy movement, GP300s were used for inter vehicular communication to co-ordinate the movement of vehicles.

Regular VHF contact was maintained with ship berthed at Indian Antarctic bay (120 km away from MAITRI) to co-ordinate men and equipment movement between ship and MAITRI. Two helicopters were given regular communication support during their operation in aviation VHF band. Also maintained periodic VHF contact with the nearby Russian station NOVO.

Installation of VHF Repeater

Line of sight (LOS) is one of the prime requirements for Very High Frequency (VHF) communication. The 165km long convoy route from MAITRI to Indian Antarctic bay is marked by undulated snow surfaces. To provide VHF communication between MAITRI and the mobile convoy, the height of the transmitting antenna is very important to maintain LOS. However, due to the

terrain and the curvature of the earth, LOS loss occurs at around 40-45 km distance. In previous expeditions, a VHF repeater station with Tx/Rx at 170/165 MHz frequency was placed on a nearby hill top behind the MAITRI station. It has given satisfactory performance but due to snow hazard in last polar night the repeater got damaged.

In XVII IAE, the damaged repeater is replaced by a new one and sufficient protections have been given to this unmanned station. The repeater was run on batteries, which were charged by solar cells. As in polar night solar cells are ineffective, DEAL has suggested for a windmill to make use of natural energy sources of this windy continent. This time, National Aeronautical Laboratory, Bangalore has experimentally used a portable windmill to charge the batteries. This has been found very effective, but proper voltage regulation circuit has to be used to protect the batteries and other equipment.

Installation of wide band HF LPA

In previous expedition, for long haul HF communication between MAITRI and India, one Log Periodic Antenna of 14-30 MHz band was erected near MAITRI station. For short haul communication between MAITRI and field camp 6.6MHz dipole had been used. To improve the communication link to field camp, one wide band (06-30 MHz) HF LPA has been installed near KAMET hut, which worked satisfactorily.

Conclusion

An effective communication from an isolated continent, Antarctica, to main land is essential to carry out scientific program efficiently and also to keep the morale of expedition members high. DEAL communication team succeeded in giving satisfactory communication for the expedition.

Acknowledgement

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