

Winter Period Communication Services at Maitri

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ABSTRACT

A team from DEAL, (DRDO), Dehradun provided real-time communication to the 27th Indian Antarctic Expedition. The continuous communication with the rest of the world has been extended in the form of voice, as well as data, communication. A great milestone was reached in the expedition by SAC and ECIL after commissioning of the Earth Station at Maitri; the team from DEAL interacted with SAC and ECIL teams for operating of the Earth Station link with NCAOR, Goa. This report describes the details of DEAL communication support at Maitri during the winter period.

Keywords: Antarctica, Maitri, Communication, Winter Expedition.

1.0 INTRODUCTION

Real-time communication is required in this fast growing scientific era. Telephone, Fax, Mail, HF and VHF communication were lagging at Indian station Maitri. Installation of Earth Station at Maitri has provided facilities like video-conferencing, high band rate Internet, live reception of Indian TVs etc. But maintenance of all the existing communication facilities is a challenging job in the presence of the windiest and coldest working conditions, as well as magnetic storms and static currents. DEAL, Dehradun has been entrusted with the responsibilities to carry-out the communication and the related arduous maintenance requirement for all the communication equipment at Maitri.

The 27th Indian Antarctic Expedition, under the Leadership of Shri Arun Chaturvedi, sailed off from Goa on 06 Dec. 2007 by chartered Vessel M/V Emerald Sea. The expedition members reached Maitri, Antarctica in four phases; by ship and flights from Cape Town.

During the sea-voyage phone, fax and email facilities were provided to the members by DEAL team, using the system available onboard ship. Messages for logistic/scientific support and other information were regularly exchanged between Ship, Maitri, Goa and various participating institutions.

DEAL's participation in the Indian Antarctic programme had started in 1991, with participation of one member to carry out experiments in HF propagation for Voice and Data services. Since 1995 (i.e. the 15th expedition), DEAL has been entrusted with the total responsibility of communication support to the Indian Antarctic Expedition.

2.0 OBJECTIVES

The main objective of DEAL Team during the 27th expedition was to provide communication support to the expedition members. It was also planned to activate the Repeater Station, which was installed earlier by previous DEAL contingents. Another important task was to provide LAN /Internet nodes in all rooms and summer labs.

3.0 EXECUTION OF TASKS

1. Operation of Earth Station for Video conferencing, Internet and TV reception
2. HF/VHF communication
3. Scientific data transmission
4. Reception of Contour Chart from South Africa (Pretoria) on HF
5. Aviation Band Communication
6. Phone, Fax service through SATCOM Terminal
7. Operation of E-mail, Picture transmission and miscellaneous work

3.1 LAN / Internet

For the first time in Maitri, DEAL team completed all wiring of Local Area Network, including Summer Labs, with the help of new DEAL team and the NCAOR representative. UTPCat-6 cable was used inside Maitri Station; and connectivity from Maitri to Summer Labs was given by STP cable. A total of 31 nodes were provided in Maitri station and 04 nodes in the Summer Labs. All nodes were tested and were working satisfactorily; but as per NCAOR directives, only 05 nodes were initially activated. Shri Arun Chaturvedi and Dr. Pradeep Malhotra, Leaders of the 27th and 28th expeditions, inaugurated the new high band rate E-mails through these nodes, on 13 Dec 2008, by sending the first emails to NCAOR, Goa. Wiring diagram is submitted in Maitri station and RJ-45 connector details are given in Table.

Pin #	Wire Colour	Purpose
1	White Orange	Data
2	Orange	Data
3	White Green	Data
4	Blue	Voice
5	White Blue	Voice
6	Green	Data
7	White Brown	Video
8	Brown	Video

3.2 HF/VHF Communication

In Maitri station, VHF communication is very vital for the daily routines like Summer Camp, galley duty, generator operations, power changeover, boiler operations, communication with pump house during pumping of water from lake, electrical problems, workshop area communication and nearby field duty operations.

Another vital area of VHF communication is the Convoy team communication. It is mentioned that whole convoy team uses Channel-1 and DEAL team was regularly in touch with convoys for support up to mark C-07. Beyond this mark, without a repeater, VHF communication was not possible. Beyond mark C-07 another backup communication was by INMARSAT-Mini, used from convoy shelter.

HF communication is essential requirement at Maitri for long distance communication, like contact with India, chartered ship and other foreign stations in Antarctica. The Radio News broadcasting in Maitri station through this YEASU120 Watt HF set is another booster for expedition members.

3.3 Scientific Data Transmission

Scientific data of the following participating organizations were regularly transmitted in compressed form, as attachments, using the email facility:

- a) Daily 6-hours synoptic data transmission to IMD-HQ, New Delhi.
- b) Phase data of 3 components digital Seismic Acquisition System to NGRI, Hyderabad.

- c) Data for Geomagnetic field variation to IIG, Mumbai.
- d) Automatic Weather Station Report to SASE, Chandigarh.
- e) Monthly Weather summery data to IMD, New Delhi.

3.4 VHF Repeater Station

The team could not restore the Repeater Station at Vetehia hill, due to lack of reliable energy source to operate the Repeater Station; but a new experiment was tried by installing a mobile repeater station on a PB Vehicle, which was placed on the highest hills near Maitri station. The communication was extended around C-07 point, but not beyond that.

3.5 Communication Support to Convoy and Field Parties

At Maitri, our team is using the 25W Motorola Model GM-900Plus for the long-range communication on the basis of Line of Sight. But due to the uneven terrain, after C-07 point (near India Bay-Russian Bay path bifurcation) direct communication was not possible. To overcome the above constraint, INMARSAT-Mini terminal was used for communication with Convoy and field parties.

3.6 Reception of Contour Weather Charts from South Africa on HF

Antarctic weather is a most unpredictable phenomenon and it is to be observed very carefully before outside activities are taken up. HF weather faxes were received, whenever the propagation conditions were suitable. Maitri station is lying in the Area-0 and for this area, Pretoria South Africa broadcasts the Weather Chart on the HF frequencies 07.508MHz, 13.538MHz and 18.238MHz. Before taking the chart, all the related frequencies were monitored and magnetic activities were confirmed from the IIG member. After monitoring, best signal channel was used to take the chart twice a day, at 1030hrs and 1530hrs. It was observed that the most suitable frequencies are 13.538MHz and 18.358MHz.

If it was not possible to receive the chart on HF weather fax machine FX-220 due to magnetic disturbances, then the help was taken from DEAL-HQ, Dehradun. One Ex-Polar Man Sh Bhagwati Prasad Semwal, along with Sh Ravi Shanker Sharma, helped in downloading the weather charts from South Africa weather site <http://www.weathersa.co.za/ship/ship.gif> and then they sent it to Maitri in compressed form, due to the size limitation of up to 100 Kb. It was a great regular support from the DEAL scientists stationed at Dehradun.

3.7 Aviation Band Communication

Aviation band communication is also necessary in Maitri. Through this communication we are regularly in touch with neighbouring Russian Station NOVOLAZAREVSKAYA on 126.5 MHz. Another important requirement of this communication is for Helicopter operations during summer period.

3.8 Phone, Fax service through SATCOM Terminal

Round-the-clock, Phone/Fax services were provided to all expedition members throughout the expedition without any down time.

3.9 Operation of E-Mail and Picture Transmission

Before 13 Dec 2008, all expedition mails were sent from INMARSAT-B terminal in Radio Room, twice a day. Thousands of mails were sent/ received during the expedition without a single breakdown. Urgently required still photographs by NCAOR, Goa were also sent successfully through this terminal in compressed form. After 13 Dec 2008, members are directly sending individual emails.

4.0 EXPERIMENTS AND SUGGESTIONS

In an experiment, Maitri base VHF Antenna height was increased with the help of an IMD balloon up to 35 meters. This increased the range of communication, but for communication up to the coastal ice shelf, a greater height of the antenna is needed. But this experiment can be used



successfully only when the wind speed is minimum and the balloon remains stable. Moreover, some skip points were still observed on the convoy route, possibly in depressions.

DEAL team has already mentioned this point to NCAOR, Goa that a properly designed cabin should be provided for the Repeater Station, as well as the power supply system at Vetehia Hill; which should be protected from winds and snow accumulation.

At least 4-5 additional Internet nodes should be activated for members at Maitri, but at a common place, not in individual cabins. If Internet nodes are available inside the rooms, we may compromise the station security. Firewall and Proxy Servers must be installed and configured for monitoring and security of the Station.

One sound-proof cabin should be available in a common place, for expedition members to talk on phone with their counterparts in India.
