

Technical Report on Antarctic Communication

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Communication is a vital need of human being in modern society. The significance of communication is enhanced further in Antarctica due to its hostile weather conditions and isolation from rest of the world. DEAL Dehradun has been responsible for providing total communication facilities viz., convey communication, HF/VHF communication to the field parties, flight operations, communication with ship and communication between Maitri Antarctica and India. The DEAL team is also responsible for maintaining the satellite terminals for telephone, telex, fax and E-mail services from 15th expedition onward. Since then the communication scenario has changed drastically and state of the art equipment have been introduced for providing HF/VHF and satellite communication. High gain log periodic antennae were installed for better performance of HF link. Experimental HF voice/data communication trials have been conducted to get the new communication window for data transfer between India (DEAL) and Maitri. The facility of digital picture transmission was also introduced first time at Maitri. In continuation of this specific programme, the following tasks were carried out during the XVIIAE.

HF communication during Voyage

The XVI Antarctic expedition comprising of 61 members sailed on 12th Dec, 1996 from Mormugao port, Goa, under the leadership of Dr. A.L. Koppa of IMD. The 100 watt HF Yeasu set was installed in the living cabin and a dipole antenna was erected at deck of the ship. The expedition members were in regular contact with DEAL and Maitri. The ship was very well in contact up to Antarctic region during voyage. The first courtesy sortee reached Maitri on 3rd Jan 97. The VHF communication was installed next day at ship for flight operation.

Installation of VHF repeater

VHF communication is highly reliable and dependable due to line of sight communication. Aerial survey was done for proper selection of site for installation of VHF repeater. The peak of Vitehia hill 300 meter above Maitri level, was selected for the purpose. The repeater was housed in a wooden box and installed at the said site. The solar pannel was kept for continuous charging of lead acid battery and a ground plane antenna was installed with proper guy wires. Excellent VHF communication range was achieved up to 120 km and we were able to maintain good contact with ship. The communication between Maitri and field

camps within range was also through VHF.

HF communication

Long haul HF communication can reach any corner of the world depending upon the propagation conditions. Regular HF communication was maintained with India using 100 watts HF Yaesu cascaded with a linear amplifier of 1000 watts PEP. The broad band log periodic antenna (6.2 to 30 MHz) was used. The communication window in HF band is available during 1900 hrs to 2200 hrs IST. There is no communication for couple of days during high magnetic storms. Lot of fading has been observed at Maitri which sustain even up to 03 minutes, due to sudden ionospheric changes. The data communication was tried in RTTY, FEC, AMTOR and PACKET mode at different baud rates. Different frequencies were tried for the purpose at different times to find out a new communication window. HF set 100 watt was also installed at ship, DG and GSI field camp for providing communication support to the scientific experiments conducted by SASE, GSI and IIG.

Weather Fax on HF

Multicom software was installed first time during XVI-IAE for receiving weather fax over HF. Better technique has been used for receiving of weather charts on HF. It has replaced the old technique of chart recording. There is no need of any special paper for the hard copy. Received fax can be aligned and edited as per our requirement. About 150 numbers of weather fax were received from Pretoria, South Africa for IMD use. These charts were found very useful for forecasting of Antarctic weather for planning the work, out side Maitri and particularly convoy to DG.

Satellite Communication

There are two satellite terminals at Maitri, one terminal is installed inside Maitri. It is being used as main terminal for telephone/fax/telex. The second terminal installed outside Maitri and being used exclusively for E-Mail services. Telex was used on a regular basis for sending IMD weather data every 06 hour. These calls were originated from IMD office at New Delhi. Weather data were stored in memory beforehand and when IMD was on line the data were transmitted from Maitri.

E-mail

E-mail terminal was maintained and more than 1000 E-Mails were transmitted from Maitri and 800 mails were received. Maitri was in continuous contact with India News Network, and regular news were received. The video picture related to the scientific activities were also transmitted over E-mail network.

Convoy communication

Indian station Maitri is 120 km away from ice shelf and Dakshin Gangotri (DG). The convoy is sent to bring the scientific equipment's, fuel, construction

material and food etc from DG to Maitri. The communication between convoy and Maitri is the backbone for a successful convoy. Therefore HF as well as VHF static/mobile communication was provided for this purpose. The intervehicular communication is also of the same importance, which was maintained in a professional way by using Dittel VHF set of 08 watts. The best possible communication was provided with the available resources.

Digital picture transmission between Maitri and India

The inauguration ceremony of Mahatma Gandhi's bust at Maitri was transmitted by digital picture transmission between Maitri and India on 26th Jan, 97. The various pictures were exchanged on the event. The Ex Hon'able Prime Minister Sh H.D. Devegoda addressed the Maitrians on voice and acknowledged the digital picture transmission between Maitri and India. In continuation many digital pictures were transmitted from Maitri to highlight the scientific activities going on during winter period at Antarctica. The golden jubilee year of independence was celebrated at Maitri with a pomp and show. The picture of the ceremony was transmitted to DEAL Dehradun.

Technical problems experienced at Antarctica

During our stay at Antarctica, the following technical problems had been experienced.

Installation and operation of VHF Repeater

1. Due to improper strength and sealing, the wooden box which was used for housing the VHF Repeater could not withstand the Antarctic conditions. Therefore proper housing of the Repeater is recommended.
2. The VHF Repeater unit should be ruggedised as per mil standard. The unit should be protected from static charge, which is one of the causes for repeated failure of repeater unit.
3. As the VHF communication is the cheapest and reliable communication for a convoy and major repair can not be undertaken at Antarctica, therefore sufficient spare units are required for the purpose.
4. High rating lead acid batteries of the order of 180 Ah are of prime importance, as the low rating battery gets discharged faster due to low temperature. The equipment's and battery should go under environmental test at laboratory before despatch to Antarctica.
5. VHF repeater of around 50 watt is required for extending the range and quality of communication.
6. Efficient VHF antennae are not available in sufficient quantity.

HF Communication

1. The log periodic antenna has gone bad number times and either the complete antenna damaged or some of the elements broken due to high wind. So the rhombic antenna should be repaired and low loss feeder cable should be connected,
2. High power solid state, heavy duty HF transmitter of 01 KW is essential to perform round the clock data experiments. The reliable digital recorders are required for signal recording.

Satellite Communication

1. Spot repair at component level is not possible at Antarctica, so spare satellite terminal is required inside Maitri. However the test & measuring equipment's at L band and sufficient spares at card level are required.

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