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COMMUNICATION DURING THE SUMMER OF 15th ANTARCTICA EXPEDITION

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Introduction

Communication is end to end meaningful connectivity between two points. Antarctica being the coldest, windiest, driest and the most isolated continent in the world, having on an average about 100 Indians during polar summers, demands excellent communication with the mainland. In the summer of the 15th Indian Antarctic expedition (1995-96), the communication responsibility of Maitri, Indian station at Antarctica, was given to Defence Electronics Applications Laboratory (DEAL) with a challenge of negotiating high, uneven and unfriendly icy convoy route. The three member team of DEAL not only took charge of total communication from Indian Navy and E-mail set-up from R&DE (Engrs), they augmented the existing set-up with state of the art communication equipment and successfully negotiated two-thirds of the convoy route without any communication breaks.

Communication Requirements at Antarctica

Long range communication **:** The communication is required between India and Maitri, India and the ship. The possible modes are satellite communication and high frequency (HF) communication.

Short range communication **:** This requirement is for inter-station communication, field station to Maitri, Maitri to helicopters, Maitri to convoys and Maitri-to ship. The possible modes are HF and VHF communication.

Long Range Communication

a) Through INMARSAT terminals

Since two of the satellites of International maritime satellite organisation (INMARSAT), cover the Atlantic ocean, this reliable mode of communication

is very useful for the isolated continent. INMARSAT terminals use INMARSAT communication satellites orbiting 22,300 miles overhead. INMARSAT services have grown so quickly among land and aviation users that the consortium changed its name in late 1994 from International maritime satellite organisation to International mobile satellite organisation. Many INMARSAT signatories, including India, have built Land Earth Stations (LES) that link INMARSAT 's five telecommunication satellites. INMARSAT have saved nearly 2500 lives on the waters and countless others on land and in the air. The following SATCOM terminals are operational in Indian station :

a) Terminal 1640522/523 — In Maitri station, Radio room

b) Terminal 1640755 — In summer camp, E-mail hut

These terminals performed excellently throughout the summer period.

These INMARSAT-A terminals provide high quality telephone, fax, telex . and data communication. These terminals can support a data rate of 9.6 kbps, though new terminals available in market now can support upto 64 kbps. MTI make terminal 1640755 is being-used for e-mail extensively by expedition members, to communicate with their family members.

b) Through HF communication

The newly installed two log period antennas (LPA), state of the art 500 watt HF transceivers with antenna tuning unit have improved HF communication to a great degree. The old 5 KW transmitter has been removed. This has helped in taking away unnecessary and too much of an electrical load from the generator sets. The new set-up has minimised the radio interference from all the electrical equipment (e.g. TA, Audio system, Telephones etc.).

Two 11 element LPAs commissioned at Maitri work in the frequency band of 14 to 30 MHz with gain of 8dB, beam width of 60° and are designed to withstand speed of 70 nautical miles an hour.

Short Range Communication

a) Communication with convoys

Making the convoys safer has always been the prime objective. In order to do so, our team installed state of the art VHF transceivers in convoy vehicles and Maitri radio room, with a VHF repeater on the top of 32 metre tall NPL-tower. This unique configuration helped in connecting two-thirds of the convoy route, free of any communication-shadow regions in VHF itself. During summer, only one convoy was taken to India bay. In this convoy, VHF

transceivers were successful in negotiating the polar cap and uneven icy terrain of convoy route.

During the winters, convoy communication shall be augmented further by using HF communication along with existing VHF mode.

b) Communication with field parties

Both the field parties at Dakshin Gangotri (DG) and Orvin mountains were given 100 W HF- transceivers. Expedition members were trained to operate these sets. Communication with DG was quite successful, but communication with Orvin mountains was not so good because of the geographical position of our camp, surrounded by very high peaks.

c) **Communication with neighbouring stations**

There was round the clock connectivity with the Russian station "Novo-lazarevskaya" (70° 46'S, 11° 49'E) and German field-station "Geo Maud" on VHF sets;

d) Communication with Ship and Helicopters :

Communication was maintained with the ship and the helicopters at the following frequencies:

HF : 12141 KHz

VHF : 118.1 MHz

The communication throughout the summer was successful with good signal strength, except during the days of magnetic storms and ionospheric disturbances.

Improvisations

After taking over the radio room of Maitri on Feb. 1, 1996 from the naval team, the following improvements were made :

a) The 5 KW vadium tube HF transmitter was replaced with state of the art 500 Watt HF transceiver which not only removed tremendous electrical load from the generator sets but also vacated a room to accommodate an additional expedition member in the wintering team.

b) Old and bulky HF sets were replaced with small and light Weight 100 Watt HF transceivers.

c) Dipole and inverted V antenna are now being used only at the lower end of HF. For rest of the frequencies log periodic antenna is being used.

d) These changes in HF set-up minimised the radio leakage from all the electrical gadgets like Television, Audio systems, Telephones etc.

e) The new 25 W/15 W VHF transceivers with repeater installed at 32 metre height extended the range in convoy communication remarkably, apart from eliminating the communication shadow zones as reported by previous teams.

f) Another important life support communication mode E-mail was augmented by installing E-mail software on new 486 m/c due to the ageing and frequent breakdown of previous 286 m/c.

g) Since all three members of DEAL team had amateur radio license with call sign VU3MKE, VU3NHQ and VU3PDD with a special call sign for Maitri as VU3AXA, numerous HAM contacts were made with Indian and International NETs. This additional radio network may prove very vital in case of failure of other communication modes and emergencies.

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