

HAM CLUB STATION AT MALAVIYA NATIONAL INSTITUTE OF TECHNOLOGY, JAIPUR, INDIA

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Abstract – Practitioner talk.

The purpose of this paper presentation is to discuss with the attendees realworld experience to establish a ham club station (HCS) at Malaviya National Institute of Technology (MNIT), Jaipur in India and learn from them to proceed. The first author received funding for research under First Cohort of Coalition of Disaster Resilient Infrastructure (CDRI) Fellowship 2021-2022 (<https://fellowship.cdri.world/fellowshipbatch-2021.php>). The ongoing research has theoretical and praxis components. Theoretical component is to write a white paper to create awareness for establishing HCS within district EOCs in India. This is covered in the academic paper “Fail-Proof and Frugal Ham Emergency Communication” just presented at this TIEMS Annual Conference 2021. The praxis component of the research is to establish HCS at MNIT.

HAM is a noun meaning a licensed operator of an amateur radio station (<https://www.merriam-webster.com/dictionary/ham>). HCS means a functioning amateur radio station with some active ham. Active ham means, ham who communicate with other ham on the radio. The practical aspects of the research praxis are the focus of this practitioner talk. The authors are working with Prof. Dharmendra Boolchandani of Electronics and Communication Engineering (ECE) Department of MNIT to establish the HCS in ECE building. Amateur radio is a “service of self training, inter-communication and technical investigations carried on by amateurs that is, by persons duly authorised under these rules interested in radio technique solely with a personal aim and without pecuniary interest . . .” according to The Indian Wireless Telegraph (Amateur Service) Rules, 1978. Further, Wireless Planning and Coordination Wing of the Ministry of Communication, Government of India (WPC) grants a club licence “to a bona fide amateur radio society, club or . . . an institution . . . in India, which has the aim of investigations in the field of radio or the training of persons in radio communication techniques. Provided that the licence shall be issued in the name of an authorized official of the society, club , . . institute . . . holding a . . . licence . . .”

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We have prepared an application for getting an amateur radio license for MNIT Ham Club (MHC). First author is a “general” category amateur radio license holder with call sign VU2KIZ and is eligible to be custodian of MHC. An amateur radio license application has to be made online on <https://saralsanchar.gov.in/>, the portal of the WPC. First author registered on the portal for applying. However, he could not submit application due to bugs in the website. Other ham also had shared these problems with him. First author informed WPC about the technical problems by phone and emails. He received a reply from the Sr. Wireless Advisor of WPC that Engineer of WPC will call him at his convenience, which has not happened. The first author for MHC has provided his Yaesu FT-840 HF transceiver, power supply, books, reports, and other materials for ham library, expertise, and time and will continue to provide them for establishment of MHC. MHC on getting licence will install amateur radio station and start functioning. Antenna plays a crucial role in radio communication. The first author to upgrade his knowledge and skill is considering auditing a course on antenna in spring 2022 at his alma mater MNIT.

We, as a part of this ongoing research project identified optimum transceiver, power supply, and antenna for a typical amateur radio station within a district EOC, which are in the Annexure. India has wide variety of geographic terrain. The specifications may vary depending on the geographical conditions of the district. MHC will approach three leading amateur radio manufacturers (ICOM, Kenwood, and Yaesu) to collaborate and provide complimentary state of the art transceiver and other equipment. It will be in their commercial interest, as it will open a market of 36 state EOCs and 739 district EOCs in India for them as suggested in the academic paper referred in the first paragraph. The authors seek attendees’ wisdom to guide us in our approach and their help in meeting our objectives.

Annexure

Equipment Suggestions for a Typical Amateur Radio Station in a District EOC

1. Transceiver:

(a) For HF band from 1.8 to 30 MHz

(i) Preferably a simple HF transceiver for ease of operation both by a novice and for field operation. The HF transceiver should preferably have an in-built Automatic Antenna Tuner Unit (ATU). Along with the ATU in-built with the HF TCVR, an additional external Auto Tuner is necessary to avoid damage of the costly HF TCVR when operated by a novice. Usually inbuilt tuners are capable of bringing down the mismatching typically when the SWR ratio is below 3:1. They fail to bring down the SWR if mismatching is 3:1. Under such a circumstance, it is imperative to have an external Automatic Antenna Tuner, which can bring down the mismatching even when the SWR ratio is too high.

LDG (USA) manufactures a range of such ATUs. When propagation conditions are not favorable fast band switching is necessary to select the best band, as these tuners retain the tuned position in memory, fast band switching is possible without damaging the radio.

(ii) VHF+UHF: A Stand Alone VHF/UHF Transceiver Base Station preferably with Cross-Band Repeating feature which would be useful as an emergency portable repeater.

(iii) HTs (Handheld Transceivers for VHF/UHF): At least two VHF+UHF HTs preferably with APRS for tracking and text messaging when cell-phone network goes down.

2. Antenna:

(i) Antenna should be a multi-band antenna. The simplest multi-band antenna is a folded dipole with inbuilt 4:1 BalUN (Balanced to Unbalanced transformer which ensures a characteristic mismatching SWR ratio of 2:1 - so the radio is safe) popularly known as T2FD antennas. Fan dipoles are very difficult to match. However, in many situations, where space is a problem, smaller versions of T2FD dipoles are available.

(ii) In addition to a T2FD (Longer version preferable) folded dipole (longer version or shorter version), each station should at least have two spare ready-to-go dipoles for 20m and 40m bands. These dipoles should have 1:1 Balun at the feed point so that when needs to be installed at compromised locations, the mismatching is kept to minimum. It is Made in India by a budding entrepreneur engineer ham: <https://youtu.be/Cda9kpm-SYk>

(iii) Accessory for Antenna

In addition to the spare antennas, for ease of installation, we should have telescopic fiber (or FRP-Fiber Reinforced Polymer Mast UV protected) poles at least extendable to 24 feet. MFJ (USA) is very costly; so we suggest for some Indian manufacturers who make FRP poles for other purposes like coconut plucking in Kerala.

Apart from the Base Station Mast at the EOC, we should have at least 2 (Two) FRP telescopic masts as spare so that they can be carried easily for field operation.

(iv) A Dual band VHF+UHF High Gain (preferably 8dBi/11dBi) Omni Directional Base Station antenna for 144-146 MHz and 434-434 amateur radio band.

3. Power Supply:

13.8 Volt DC (Not 12 Volt as 12 volt supplies might reduce the output RF power of the HF radio as the final amplifier sections are designed for 13.8 volt operation) Power Supply with at least 23 Ampere power rating for a 100 Watt radio.

Should have two such supplies - one for HF and one for VHF/UHF Base Station

The DC power supply should have provision to charge a 12 Volt high Ampere battery (23 Ampere hour to 150 Ah) in float/ boost/ trickle charge mode so that in the event of a power outage, the radio communication is not disrupted.

N. B.: We have not specified any specific brand or models as these would be at the discretion of the procuring agency. In case a district EOC wants suggestions of models from different reputed international brands, we shall provide that..

Keywords: ham club station, Malaviya National Institute of Technology, Jaipur, amateur radio, transceiver