Amateur RADIO Society News

Newsletter of The Amateur Radio Society of India (Member of IARU) English / Hindi Quarterly

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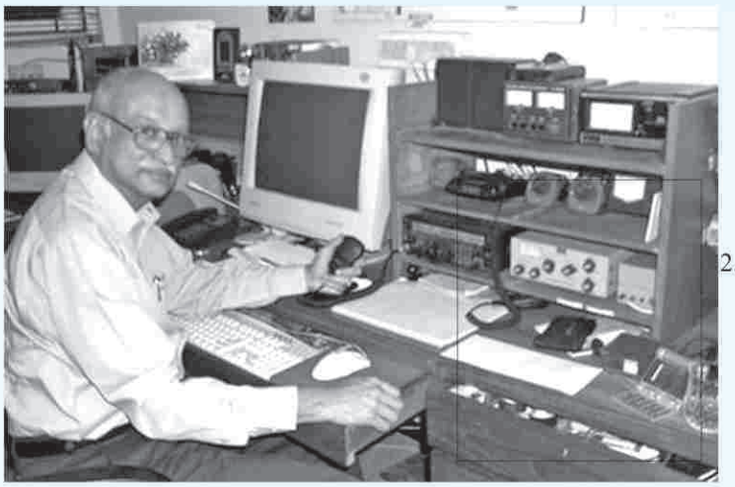


President's Message

Dear members

First of all let me wish you and family the very best for 2011. I hope together we can move amateur radio forward.

The ARSI AGM was held in Mangalore when the annual report and accounts were passed and a budget for the coming year also finalised.

This is the first issue of the news magazine being brought out in PDF format. As you may be aware, the cost of printing and distributing four issues of HRN every year became so prohibitive that it eroded all the income of ARSI, leaving nothing to run the organization. So we sent out a message to all our members and the majority has voted to do away with the hard copies and make the magazine an e-magazine which can be downloaded from the ARSI webpage.

We will be able to bring out many more issues in this format

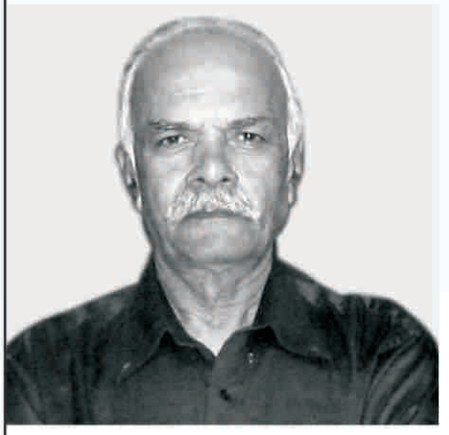
We have taken the following steps over the past few months:

1. Revamping the webpage and try and make it interactive
2. 24 "grab kits" have been prepared and are in the process of being distributed. These kits contain the minimum equipment for use in emergency communications so an amateur can just pick up his radio and move with the kit in case of an emergency. The first kits were handed over to the Mangalore hams during the ARSI AGM held there
3. We do have to appoint regional coordinators in all areas where we do not have them (we are still looking for volunteers)
4. We continue to press WPC for frequencies that other countries in IARU Region 3 enjoy and which were not allocated to us
5. ARSI was represented for the very first time in the Department of Telecommunications National Frequency Planning meeting, where our views were put forth and hopefully will bear fruit

We expect a lot more activity over the coming months.

Gopal Madhavan, VU2GMN

From the Editor's desk



Finally, here is the e-edition of the HRN. I am glad this form was accepted by most of the members; mainly because there is no limit to the number of pages, and we can now include all photos sent to me!

May I request members to send articles, news, photos, etc. so that we can make this newsletter more interesting?

Wishing all of you a very HAPPY & PROSPEROUS, DX-FILLED

NEW YEAR 2011.

Ganesh VU2TS

HIPA Hams

Indian summer of 2010 was at its peak with temperatures soaring to 46◦C to 47◦C breaking all records in the North. The invitation from Dr. Bhuvan, Additional Director, Haryana Institute of Public Administration (HIPA) came as a surprise with short notice. An elite group of Administrator, Police Personnel, officials of Red Cross – all from various districts of Haryana were to be addressed the importance of Amateur Radio during floods, being the part of week long training.

VU2BDX (Bharat Balsavar), ARSI Life Member and VU2OEC (ARSI Regional Representative) discussed the modalities and reached the prestigious institute of Government of Haryana on the morning of 23 May 2010 loaded with equipment, antennae etc.

Within 30 minutes, the Trishul antenna - much talked about among the hams of Delhi, was installed.

Dr. Bhuvan introduced us to the elite group and requested for bilingual presentation as almost all belonged to Hindi speaking regions. VU2BDX belongs to Karnataka and without any hesitation commenced the presentation in flawless Hindi. As the talk about Amateur Radio with colourful slide presentation progressed, the inquisitive attention among the participants was visible.

During the tea break, many came forward with initial queries about licensing, the cost of equipment and compared it to the one's being already used by government agencies.

The next part of the presentation gripped everyone as they wanted to touch the radio and have a feel of it. We were again bombarded, this time with queries about installation, various radio channels and its feasibility during any probable disasters like earthquake/floods. One participant commented this being the most interesting presentation during the whole training programme.

At the end of the Amateur Radio presentation, many promised to pursue and disseminate it with their counterparts in their districts/departments.

For VU2BDX and VU2OEC, both being ARSI representatives, was the memorable and holistic experience while imparting the know-how of Amateur Radio.

[The Trishul Antenna is being sold by VU3BPA – Om Arun, for a token sum of Rs.410/- only. It comes with 25 feet coax with PL259].

AMSAT INDIA

Organization update for post of President and Vice President.

An emergency committee meeting was held on May 26th 2010 at the residence of VU2RMS, Ramesh as we had received request from the current president Air commodore Suby, VU2UV to relieve him from the post of the president citing health reasons. This was accepted by the committee and was proposed and accepted by the committee that VU2RMS, Ramesh take up the role of the president and lead the organization towards the vision and mission of AMSAT India.

It was also proposed by VU2POP, POP to request VU2VP, Dr. Ved Prakash Sandlas to take up the role of Vice President which was accepted by the committee and also by Dr Ved Prakash Sandlas when contacted by phone. VU2VP is an active Radio Ham and associated with the Indian Amateur Radio satellite programme from 1980's and an AMSAT India member. Detailed bio data and his achievements and contributions can be found at

http://www.freewebs.com/vpsandlas/

Please join me in welcoming VU2RMS, Ramesh as the President and VU2VP, Dr.Ved Prakash Sandlas as the Vice president of AMSAT India and we would like to thank VU2UV, Air commodore Suby for his guidance and focus on the activities during his tenure, he will continue

to be a member of the core committee.

Nitin [VU3TYG]

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WIA to host 2011 Region 3 ARDF Championships

The WIA will be the host society for the IARU Region 3 ARDF Championships to be held in late 2011. The event is held every two years, alternating with the World ARDF championships.

The last IARU Region 3 Championships, scheduled for late 2009 near Bangkok, Thailand, were cancelled at the request of the host society because of the risk of political unrest.

Jack Bramham VK3WWW, WIA ARDF Coordinator and an International Class Referee will be responsible for the organization and management of the event, working with the Victorian ARDF Group and supported by the WIA. The WIA will provide administrative support for the organizers.

The event will be conducted in regional Victoria, though the venue has yet to be finalized. The IARU Region 3 ARDF championships were last held in Australia in 2003, near Ballarat, Victoria. They were regarded as a great success.

Volunteers will be called for to assist Jack's team.

Look out for future information on the WIA site www.wia.org.au and on the Victorian ARDF Group site www.ardf.org.au .

ZS WAGS

Worked all South African Grid Squares

http://www.zs6stn.org.za/zswags/pdf/ZS_WAGS_Rules_Final_July_2008.pdf

The aim of this award is to involve any licensed amateur radio station in a fun activity to collect at least one contact from each of the Maidenhead grid squares. There are 83 South African grid squares which are listed below:

JF86–JF89, JF95–JF99, JG80–JG81, JG90–JG91, KF05–KF09, KF15–KF19, KF25–KF29, KF36–KF39, KF47–KF49, KF58–KF59, KG00–KG05, KG10–KG14, KG20–KG25, KG30–KG37, KG40–KG47, KG50–KG57, KG61–KG65.

EVERYTHING YOU WANTED TO KNOW ABOUT SUNS POTS …

If the sun is viewed safely through proper solar-filter, or by projecting the sun's disc on a screen - dark areas can be seen on the disc from time to time. These can last

anything from a few hours right up to several weeks. These spots are cool areas (relatively speaking) on the surface of the sun. The temperature is only about 3000°C against a sizzling 6000°C for the rest of the surface. [It is much hotter under the surface of the sun, reaching temperatures in excess of a million degrees Celsius.]

These sunspots are areas where there is intense magnetic activity. The fields in these areas are enormous and as a result the surface of the sun is disrupted. In these areas the surface cools dramatically causing a darker region to be seen.

The area around the sunspot is known as a plage. This is slightly brighter than the surrounding area and it is a large radiator of cosmic rays, ultra-violet light and X-rays. In fact it results in increase of overall level of radiation emitted by the sun. In turn this increased radiation level from around the sunspots causes the ionosphere around the Earth to become ionized to a larger extent. This results in the reflection of high frequency radio signals.

The "Sunspot number" is not the number of sunspots that are observed but a number indicating the level of sunspot activity. The number is very closely related to the actual amount radiation received from the Sun. In this way it is a good measure of solar activity. The daily readings are smoothed mathematically to take out the erratic variations to give the Smoothed Sunspot Number or SSN. [The "sunspot number" is calculated using a formula developed by a Swiss Astronomer named Wolf. The sunspot number today, as this is being printed is 37 and there are not actually that many sunspots today.]

The number of sunspots on the surface of the sun varies with time. At times very few or even none may be visible, whereas at other times the number is very much greater. Although the number varies greatly over short periods of time as the sun rotates, careful analysis using the SSN reveals a longer term trend. It is found that over a period of approximately eleven years the sunspots vary from maximum to minimum. At the peak of this cycle conditions on the bands at the top of the short wave spectrum are very good. Low power stations can be heard over remarkably long distances. At the bottom of the cycle bands around 30 MHz will not usually support normal propagation via the ionosphere.

Sunspots have been observed by the Chinese since before the birth of Christ. However it was not until the mid-eighteenth century that astronomers started to keep records of sunspot numbers. By looking at these over the years it is possible to see the trend since then, and the cycles which have occurred since then. Cycle number 22 officially started in September 1986. It started with a sunspot number of 12 and rose rapidly over the following 33 months to reach a peak of 158. From its peak the sunspot number fell slightly and rose again to give a second, smaller peak before falling to bring the cycle to an end in 1996. But scientists are puzzled over the Sun's recent behavior.

The last solar maximum, during Cycle 23, peaked in 2000, and in 2008 the Sun reached Cycle 23's solar minimum and sort of stayed there. It stayed there so long in fact that some began to wonder if the Sun would ever wake up. Finally in December 2008 the Sun was active again and began Cycle 24.

During 2009, sunspots occurred only for 29% of the year – translating to 260 days without any sunspots. During 2010 there were 51 days without sunspots (up till end December)

So, all indications, Cycle 24 has been a very weak cycle. While Cycle 23 peaked out in 2000 with an average sunspot number of 120, the current consensus prediction for Cycle 24 is for a maximum sunspot number of only about 90, to peak around May 2013.

We will have to wait and see..

VU2TS

USING CW – the art of communication

You might have noticed, most amateurs who use CW regularly today are older generation hams, who learned CW when they were quite young. For many newcomers, CW seems "difficult" and some even think it is "impossible". This is not true. Anyone can learn and use CW regularly – it is just another "language", that's all.

Here is a simple tip for those who think learning CW is not for them. This happens after a week or two of learning when one feels he is just not learning anything. The trick is, when this happens you take a break of a week or so. Don't even think about CW. And then get back to the class. You will see how things seem so easy and how the learning process is fast. Simple!

First and foremost is practice – by listening on the CW portions of HF bands. While it is true that most CW operators are sending at speeds higher than a beginner can copy, there are stations (usually on the upper end of the CW portion) that are slower. This would be a good opportunity to contact such stations resulting in practice for both.

After a few days of such contacts you will find your CW speed – both copying and sending is improving.

The present day youngsters are enamored with the SSB mode; so when the mandatory CW contacts are made, they get the Phone Endorsement and the Morse key is relegated to the shelf. The thrill of CW QSOs cannot be easily explained, High-speed CW alone does not make a good CW operator! A good CW operator needs to know a lot more. For instance when there is a QSO going on, you need to find out who is contacting whom and more importantly, who is staying on the frequency. For instance, if VU2XYZ is contacting a DX station you cannot simply call the DX station when the QSO has ended. VU2XYZ may be using the frequency to contact other DX. By simply listening for a few minutes you can find out who is staying on the frequency. I have missed many a rare DX because the frequency was used by another station whom I had already contacted or I was not interested in contacting. The DX just moved away after the contact. I usually nail the DX elsewhere on the band.

Do you know that wherever you are, you are "DX" to stations far away? Therefore if

you are calling CQ and if someone calls you at a speed you cannot copy easily, you can request the other station to slow down – or QRS. If the other station is keen on a contact with you, he will oblige. On the other hand, if you are sending at a good speed and if someone calls you with slow CW, it will be appreciated if you can reduce your speed to match the other station. Whether you do it or not makes the difference between a good operator and a lid. (for newcomers: LID = Poor Operator)

Many DXpedition operators give preference to QRP stations and slow speed callers. "All stations QRX – the QRS pse K"

There are many who can send fast but are not able to copy at the same speed. So it is important that you send at the same speed that you can copy to ensure a good QSO.

Most of the time, long-haul DX openings are short; at such times it is quite in order to make contacts "contest style". Call the other station, give him a report, and listen for the next caller. When there are hundreds of stations calling you – a pileup – it is not appropriate to

give your name, your QTH and the weather report like in a normal QSO. A good operator gives a chance to other callers to make contacts before the conditions fade.

When your sending improves, you will notice other stations wanting to stay back and chat with you. Good CW is like talking – the other station should not have any difficulty in copying your fist and of course, vice-versa.

Back in the old days almost every contact was a long winded QSO – name, QTH, rig in use, antenna, weather and other topics like hobbies other than ham-radio, etc. But now with the increased number of stations on the bands and the propagation poor, you do not hear many

stations having long-winded QSOs. More often than not, it is just RST and name of operator to complete a QSO. However, you can always find someone to chat on CW and one way of doing this is to ensure you send good CW.

Use and enjoy CW!

VU2TS

News from here and there

Amateur radio enthusiasts who travel to the U.K. and own an iPhone may find two new applications from Mark Turner, G7LEU very useful.

First is Ham Dashboard which is designed for hams on the move or away from home.

Ham Dashboard shows a searchable list of repeaters in the UK and Ireland, along with details of input and output frequencies, a map, and a handy bearing arrow for each system. It also includes a basic APRS tracker that allows your position to be sent to the APRS-IS network.

You find this one at the iTunes store at www.tinyurl.com/2af5rsg.

The second, Ham Tracker allows radio amateurs on the move to send location updates to the Internet side of APRS from their mobile device. Once sent, your position can be tracked using services such as aprs dot fi. Using Ham Tracker makes it easy to send an email containing

an aprs dot fi tracking link for your callsign or a map link showing your current location. This one is also at the iTunes store at tinyurl.com/2c8f4uw. More details and screen shots of botg aps are on line at www dot kramstuff dot com. (G7LEU)

Vietnam CubeSat to launch in 2011

A Vietnamese Amateur Radio CubeSat, F-1, is slated for launch towards the end of 2011.

The F-1 CubeSat will carry 2 independent transceivers (Yaesu VX-3R & MHX L400) using amateur radio 145 and 437MHz bands. The transmission speed will be 1200bps and higher using FM AFSK & GMSK modulation, AX.25, KISS protocol. It will carry a low resolution C328 camera with 640x480 resolution.

The IARU satellite frequency coordination committee have agreed a downlink frequency of 437.485MHz and it is hoped to launch in the 4th quarter of 2011.

Vietnam F-1 CubeSat on Facebook

http://www.facebook.com/group.php?gi=116436068290

F-1 on IARU Satellite Frequency Coordination pages

http://www.amsatuk.me.uk/iaru/finished_detail.php?serialnum=150

Tnx Southgate Amateur Radio Club

DO YOU KNOW: North Korea – P5 is No.1 on the list of most wanted countries on the DX bands?

DX Code of Conduct

I will listen, and listen, and then listen again before calling.

I will only call if I can copy the DX station properly.

I will not trust the DX cluster and will be sure of the DX station's call sign before calling.

I will not interfere with the DX station nor anyone calling and will never tune up on the DX frequency or in the QSX slot.

I will wait for the DX station to end a contact before I call.

I will always send my full call sign. I will call and then listen for a reasonable interval. I will not call continuously.

I will not transmit when the DX operator calls another call sign, not mine.

I will not transmit when the DX operator queries a call sign not like mine.

I will not transmit when the DX station requests geographic areas other than mine.

When the DX operator calls me, I will not repeat my call sign unless I think he has copied it incorrectly.

I will be thankful if and when I do make a contact.

I will respect my fellow radio amateurs and conduct myself so as to earn their respect.

Amateur Radio and the Haitian Earthquake

When the call went out, Amateur Radio answered.

Allen Pitts, W1AGP

On January 12 at 16:53 local time the earth rumbled and history changed. Haiti suffered a catastrophic magnitude 7 earthquake with an epicenter only 16 miles from Port-au-Prince, Haiti's capital. More than 200,000 people died outright, although the true number may never be known with so many remains still buried in the rubble. Thousands more were injured.

This tragic event began weeks of activity by hams from all over IARU Region 2 in a united, transnational effort. Arnie Coro, CO2KK, the IARU Region 2 Area C Emergency Coordinator and Ramón Santoyo V., XE1KK, Region 2's Secretary, quickly became centers of information and coordination.

By 8:30 the next morning a message was sent from David Sumner, K1ZZ, Chief Executive Officer of the ARRL to Jean-Robert Gaillard, HH2JR, Secretary for the Radio Club d'Haiti:

"We are watching news reports from Haiti with great concern for you, the members of the radio club and your entire nation. We are anxious to help if we can."

Along with the Maritime Mobile and SATERN nets, the entire Caribbean was ringed with listening stations, but 48 hours later only HH2JR, HH6JH and one UN worker had been heard on the air.

KG9C

An improvised HF/VHF "antenna farm" at the University of Miami hospital in Port-au-Prince.

KG9C

When the University of Miami doctors weren't treating patients, they were sleeping in this tent city.

ARRL Headquarters swung into action, contacting key agencies and Amateur Radio news media. Conference calls were arranged to share information, quell rumors and receive requests for aid. It quickly became apparent that this was not a replay of Hurricane Katrina; the international aspect was something very different. Passports, transportation, immunizations, language differences, lack of food and water, gasoline and many other considerations including the need for military aid to even support a deployment had to be resolved. If there were to be any hams "going in," it would only be with established response teams.

ARRL Ham Aid

The ARRL Ham Aid program was created after Hurricane Katrina to provide aid and equipment in emergency responses. Staff had not yet laid the groundwork for applying Ham Aid to an international crisis, but they quickly shifted gears and, in true ham fashion, found a way.

Using our contacts within the IARU and domestic agencies, several key areas of need appeared. Radio Club Dominicano from the Dominican Republic, which shares the island with Haiti, was able to send in ham teams almost immediately, but they needed more equipment. The Miller School of Medicine at the University of Miami was dispatching a field hospital to Haiti and needed Amateur Radio communications support. The Salvation Army had long had a large presence in Haiti and their SATERN unit had a Memorandum of Understanding with ARRL. They also requested the League's help.

Headquarters staffers Norm Fusaro, W3IZ, Steve Ewald, WV1X and Dan Henderson, N1ND, wasted no time assembling the

Ham Aid kits. Manufacturers ICOM, Yaesu and Kenwood quickly and generously provided what ARRL HQ did not have on hand. Diamond Antennas and MFJ donated special gain antennas for use in mountainous areas. Not once was a need made known that an Amateur Radio-related company didn't respond, "Yes!"

ARRL Warehouse Supervisor Steve Capodicasa arranged shipping via Federal Express. This wasn't as simple as it may sound. Steve spent considerable time on the telephone and e-mail shepherding our cargo through Customs and tracking its safe arrival.

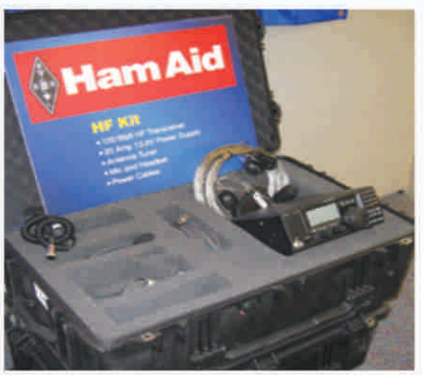
Creative Solutions

Doug Lapin, K1OY, is the Dominican Republic's Ambassador accredited to the Secretary of State of Foreign Relations. He

How You Can Help

The ARRL Ham Aid fund was established in 2005 to provide a source of Amateur Radio equipment that would be immediately deployable in a disaster. After Hurricane Katrina, hams responded generously to requests for funds and those donations created the kits that are now deployed in Haiti. The ARRL invites clubs and individuals to help keep Ham Aid in readiness for deployment wherever it is needed. The costs, not only of equipment but also transport, can be considerable. Contributions in any amount are most appreciated. Checks may be made payable to "ARRL Ham Aid" and sent to 225 Main St, Newington, CT 06111.

A typical Ham Aid kit at right.



Ambassador Douglas Lapin, K1OY, (at the microphone) with Hugo Ramon Sanchez, HI8VRS, President of the Radio Club Dominicana, operating from an old plantation house they shared with 12 French humanitarian workers near the Petionville section of Port au Prince.

Weary doctors take a break by the Amateur Radio and MARS communications stations.

The epicenters of the January 12 and 20 quakes southwest of Port-au-Prince, Haiti.

happened to stop by ARRL Headquarters with his son while they were on their way back to the Dominican Republic. His translation skills were put to use in a phone call to the Dominican team and he also graciously carried 10 handheld transceivers with him on the flight that evening to Santo Domingo.

In the meantime, there was plenty of ham activity on the ground. A Dominican Amateur Radio club joined relief convoys and made multiple forays into Haiti to set up 2-meter FM repeaters that were heavily used by the Red Cross and other international teams. During one of their trips the convoy was attacked, but fortunately none of the club members were injured.

Julio Ripoll, WD4R, who is normally found at the Miami Hurricane Center, became the contact person for the University of Miami medical team. The Ham Aid equipment was put to use at their facility at the airport in Port-au-Prince. The radios are used to provide tactical links in the local area as well as long distance communications back to the US.

In addition to analog communications, the MARS component of the HF digital Winlink 2000 network provided critical backup for the University of Miami's e-mail system. "The successful use of this technology in a real-life emergency demonstrates its value as a communications tool," said Jim Griffin, the Army MARS Chief. "Our Army, Navy-Marine Corps, and Air Force MARS operators in Haiti have all used the system with excellent results," he added.

Even as this article goes to press, reports continue to arrive. Amateur Radio is still involved in communications support throughout the country. Satellite telephones are often overwhelmed from high call volume. The cellular telephone network is slowly coming back online, but it is reliable only in the capital. Land line telephone communications are almost non-existent.

Once again, Amateur Radio has proven itself as a valuable partner in disaster relief. When the call goes out, we never fail to respond.

Allen Pitts, W1AGP, is the ARRL Media Relations Manager

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Amateur RADIO Society News

PUBLIC SERVICE

EMERGENCY COMMUNICATION

Readiness ▪ Response ▪ Resilience

Compact, Versatile, Multimode "Grab and Go" Kit for Emergency Communications

John Brodie, VA7XB
va7xb@rac.ca

Introduction[1]

In 2007, a few dedicated members of the Surrey Emergency Program Amateur Radio (SEPAR) in British Columbia responded to a need identified by the Surrey Fire Services, mindful of the lessons of Hurricane Katrina and a more local catastrophe, the 2003 Kelowna fire storm.[2] SEPAR was asked to conceive and construct a portable Amateur Radio package capable of supporting the Surrey Emergency Program's communication function.

The constructed units were to be capable of communication at HF, VHF and UHF frequencies, including CW, SSB and FM, PACTOR III and packet for Winlink messaging. Portability was essential, such that each kit could be transported by an SUV or passenger van and be deployed by trained radio amateurs within 30 minutes of arrival at the incident scene. This article describes the successful results of a year-long effort, which included conceptual planning, construction of a mock-up, a prototype and two cloned copies, as well as trials and modifications.

Features

Each complete kit is comprised of three transportable units, containing radios, antennas and HF antenna support poles, respectively. The radios — two ICOM IC-2820H dual-band VHF/UHF transceivers and a Kenwood TS-480SAT HF transceiver in each kit — were chosen because of their combination of features, compatibility with emergency gear utilized by interacting emergency groups, small size and proven reliability.

Figure 1 — Three control heads removed from the base are displayed close together, but each can be relocated a distance of 8 feet from the base. The IC-91AD handheld transceiver has been removed from its storage bracket on the lower shelf. The laptop can also be moved the full length of its cabling when using pactor or packet.

The radios and antennas are housed for storage and transport in hard-shelled Pelican cases with wheels, providing lockable, waterproof and robust protection. A heavy duty, military style duffle bag contains the collapsible pole sections for the HF antenna. A 90 Ah AGM sealed battery and a 2000 W Honda gasoline generator are also essential components of each kit.

Each of the three radios is connected by an 8 foot long cable bundle to its remote control head, an arrangement that permits three operators to be physically separated from one another when the kit is deployed (see Figure 1). The control heads, fastened to custom aluminum panels, are held firmly in place on the top shelf of the base unit by Velcro during transport and until separated for operation.

The RF output from each radio is connected to its own dummy load when the radio is stowed, thus affording backup protection against damage to the transmitter in the event the operator fails to connect a resonant antenna before powering up the next time.

An SCS PTCII-pro modem with two built-in packet modules does double-duty for Winlink messaging by enabling PACTOR

III on HF, as well as packet on VHF and UHF. One of the IC-2820H radios is permanently assigned to 1200 baud packet and the other to 9600 baud, by separate connections to the SCS modem packet ports.

Power to the radios and accessories is provided by either a 32 A Alinco DM-330MV switching power supply operating on 120 V ac from the mains or generator, or a 12 V AGM sealed battery, depending on circumstances. All 12 V power is routed through a West Mountain PG40 PWRgate and RIGrunner 4012 distribution panel. Anderson Powerpoles with 35 A contacts are employed on all 12 V connections in the interest of standardization. The 12 V AGM battery is kept on float charge during storage but is also charged during connection to the power supply through the PWRgate when 120 V ac power is available.

Each of the three identical kits is identified by color-coded labeling, which encourages components in the field to be returned to their respective kit without confusion. All interconnection wiring is labeled with short text descriptors to ensure correct connection when changes must be made and to aid in troubleshooting.

A separate RF power/SWR meter that displays HF power output and SWR, can be relocated from the base unit to the TS-480SAT control panel for convenience of operating (see Figure 2). An SGC external speaker for the HF radio provides additional flexibility in the degree of noise reduction and the width of the DSP filter. Both the foregoing items may be considered optional because they duplicate features found in the HF radio.

Antennas

Tripods designed to hold photographic screens are used to mount the VHF/UHF antennas to a height of up to 12 feet. These particular tripods were purchased in pairs in a convenient carrying case. During storage and transport, the vertical element of each VHF/UHF antenna is affixed to its tripod upside-down. Ground plane elements are stored in a 3⁄4 inch diameter PVC tube

Figure 2 — The TS-480SAT control panel with the SGC noise canceling DSP speaker fastened to the back. In this view, the VE7XDT power/SWR meter has been relocated from the base to the control head and is held in place by Velcro — both 12 V and a signal cable must be provided at the control head for the meter to function at this location. When the meter is not in place, the spot is occupied by the hand microphone.

complete with threaded cap attached by a short, flexible cable to a Robertson-head screwdriver used in assembly, all of which are retained in the same bag as the antennas.

When deployed, eight of the HF antenna poles are telescoped together and inserted into the HF tripod base to form a mast 30 feet high for supporting the off center-fed (OCF) dipole in an inverted V configuration. A custom aluminum ring with links is inserted between the top and next-highest pole for attachment of three guy ropes. The remaining four poles are used to support both ends of the antenna legs at a safe height above ground. If set up as recommended by the manufacturer, this antenna is resonant without tuning on all HF bands except 15 meters.

Computer, Software and Programming

A Lenovo laptop in each kit runs Vista, along with Airmail and Paclink for Winlink 2000. Equipment manuals, reference material and training documents are stored as PDF files in memory for easy access. The laptop is powered from a combination 120 V ac/12 V dc adapter. The 12 V adapter can be connected to a 12 V cigar jack on the rear panel of the unit.

The ICOM radios are programmed with local emergency frequencies and, in the case of the IC-91AD handheld transceiver, D-STAR frequencies as well. Memory programming for the IC-2820H is accomplished with CS-2820 software, an OPC 1529R serial cable (alternatively OPC-478 or its USB equivalent) for programming and an OPC-474 cable for radio-to-radio cloning. Programming of the IC-91AD requires RS-91 software, using the same cables as those for the IC-2820H.

Construction

Construction requires no special tools except a band saw for cutting aluminum stock. Chassis punches in sizes of 5⁄8, 3⁄4, 7⁄8 and 1 inch are also useful, but not essential if the construction team is willing to file drilled holes out to size. Careful attention to layout of components is critical

Figure 3 — The radio kit, plus manual pouch and utility case (containing headphones, laptop power cables and CW keyer) all fit snugly inside a Pelican 1640 case.

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in order to fit everything within the available space, including allowance for cable runs and access to front and rear jacks. A layered construction is utilized, with the equipment positioned as follows: radio control panels on the top shelf; laptop and modem on the middle shelf; power supply, radios and power distribution on the bottom shelf.

Outside dimensions of the radio assembly are 23 × 23 × 13.5 inches high, a size that makes for a snug fit into a Pelican 1640 case. The shelves are made from 1⁄8 inch aluminum sheet, joined together by 5⁄16 inch threaded steel rod, stiffened by nuts and lock washers separated by ferrules made from 3⁄8 inch ID round aluminum tubing. Front and rear horizontal structural elements are made from 3⁄4 × 3⁄4 inch aluminum angle, while the adjacent side elements consist of 3⁄4 × 3⁄4 inch hollow square aluminum stock. The bottom shelf is set 3⁄4 inch up from the table top on the threaded rods to accommodate protruding fasteners. Spacing between the bottom and middle shelf is 4 inches and between middle and top shelf is 31⁄4 inches. Acorn nuts and plastic tip protectors finish off the top and bottom, respectively, of the threaded rods.

The radio control panels are made from 0.090 inch thick aluminum cut to 7 × 12 inches and bent longitudinally into a 3 × 4 inch L-shape. Access to a metal shop "break" is recommended for the larger bends, such as these. Additional 0.075 inch aluminum stock is required for the back utility panel and custom brackets. After layout and drilling, the edges and corners of the aluminum parts were rounded and smoothed and the surfaces polished with buffing compound, with a view to a professional-looking product.

Standard cable lengths, as provided, were seldom suitable without modification. The preferred procedure is to cut long cables to proper length and install new connectors. Where this is not feasible, cables can be shortened by doubling up inside heat-shrink tubing or forming into coils, with the excess hidden under the radios. The mounting bracket provided for the TS-480SAT is used without modification, with the radio raised to the highest available position on the bracket to allow for cable placement beneath.

The IC-2820H radios, which are stacked two-high at the rear of the unit, require a custom bracket made from 0.075 inch aluminum stock, also with allowance for cable storage beneath the radios. The modem bracket and the IC-91AD holder are fabricated to suit. The DM-330MV power supply is secured to the lower shelf by attachment bolts installed after removal of its bottom panel and drilling bolt holes.

The radio control panels and brackets, after bending and drilling, were roughened with emery cloth, then primed and painted with several coats of textured enamel and a top coat of clear acrylic. Mounting feet on the panels, made from 3⁄4 × 3⁄4 inch angle, are inserted in slots cut into the panels and bonded with "JB Weld." This bond is further strengthened by a tightly bolted 3⁄16 inch threaded rod running longitudinally across the underside of the panel thereby providing a convenient anchor for cables, which are secured by zap straps. Cables joining the main unit and remote control head are bundled within 1⁄2 inch split sheathing and secured at each end with electrical (Loomex-type) cable clamps.

Dummy loads are custom-made from 45 Ω, 35 W Ameritron non-inductive resistors mounted on acrylic sheet inside a Hammond 1590CFL flanged cast aluminum box bolted to the back panel. RG-8X coax joins the resistors to their respective radios by way of double male PL-259 joiners connected to UHF-type bulkhead adaptors at the rear of the top shelf of the base unit. The dummy

loads provide an SWR of 1.0 up to 28 MHz, 1.7 at 144 MHz and 2.2 at 440 MHz.

External speakers are required for the IC-2820H control heads, as their built-in speaker is located in the radio, which may be some distance away from the control head during operation. The TS-480SAT utilizes an SGC external speaker, although this radio does have its own speaker built into the control head. Headphone and external speakers for all radios are wired to allow the operator to select either speaker only, headphones only or speaker plus headphones operation.

The potential for undesired RF coupling associated with the long cables connecting physically separated units is addressed by the liberal use of split ferrite cores on dc, data and RF cables — approximately 42 per kit.

Two persons are required to move and lift each case comfortably and safely, considering that the number 1 Pelican case containing the radio kit weighs approximately 120 pounds and the number 2 Pelican case with the antennas, coax and miscellaneous items weighs approximately 130 pounds. Handles and wheels on both cases make transport relatively easy and the complete assembly of three units plus battery and generator fits comfortably in the rear compartment of a standard SUV or passenger van. Figure 3 shows the base unit stowed in its Pelican case along with the document pouch and utility bag, ready for transport. Figure 4 provides a view of the entire radio assembly in its skeleton frame.

Modifications

During field trials, when the radios were being powered only by the battery, the voltage drop across the PG40 PWRgate was found to be excessive, as a result of the Schottky diode in series with the battery. A simple solution is to leave the power supply and load connected to the PWRgate normally, but to connect the battery directly to one of the fused terminals on the RIGrunner panel, thereby bypassing the diode. Because it also bypasses the charging diode and resistor, this arrangement also allows the power supply to charge the battery at a higher rate than the PWRgate's normal 1 A.

An external CW keyer is included in the kit even though the TS-480SAT has its own internal keyer. This was found necessary because many CW operators are unable to adapt to the unique characteristics of the Kenwood built-in keyer.

Not all construction details can be provided in an article of this length. A CD containing additional figures, layouts, high resolution photographs, a complete list of components, cabling hookups and further construction is available to those wanting to duplicate the kit or use it as a starting point for their own design. The SEPAR team will also be pleased to answer specific questions on request.

Credits and Acknowledgments

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All photos by John Brodie, VA7XB.

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