

IMPORTANCE OF COMMUNICATIONS IN A CAVE RESCUE

by
Peter Robertson

Because of the large number of people generally involved in a cave rescue it is most important that everyone knows exactly what their job is and to whom they are responsible. Without this knowledge confusion will most certainly result.

But this is not all that is needed. A reliable and accurate means of passing information and requests is also required — hence communications.

The means of passing messages falls into several categories:

A

The most common and simplest is by **word of mouth** between two people. If however, three or more people become involved in passing the message then each may shorten or lengthen it depending on the person and it may even lose some of its original information.

This will cause all sorts of complications during an emergency through loss of time and wasted effort.

Therefore all messages should be written down concisely and then passed on for delivery. It is also a good idea to have the reply returned on the same piece of paper as confirmation.

B

The second method is by **visual signals**. However this method can be too easily misinterpreted and should be avoided in a rescue unless all else fails!

C

Written Message — this method should be the most accurate as no distortion of the message content can occur between the two parties concerned as it passes through many hands, but it is slow and liable to loss or damage and is therefore not completely satisfactory for cave rescue work particularly if the cave is long or wet.

D

Telephone — this allows fast, accurate and reliable passing of messages with no interference, and is most certainly the best system but it requires the physical effort of laying a cable from the outside control centre to some convenient point close to the scene of activity underground. It can also require vast lengths of cable.

E

Radio telephone — or two way radio as it is commonly known, is certainly the most flexible system of giving point to point communication and if set up and operated with strict control can match the telephone system.

Its main limitation is that it is unpredictable in its ability to reach the inside of a cave and therefore should not be relied upon as the primary cave to outside communication path.

It is however the only efficient way of despatching and controlling search parties and supplies outside the cave and its use and operation will be considered here.

Considerations when choosing a radio telephone system are:

- (i) terrain — flat or hilly
- (ii) area of coverage — square miles
- (iii) access — roads or walking
- (iv) siting of the base station.

Terrain versus frequency:

Flat country: HF (high frequency) and VHF (very high frequency) will work well but VHF can suffer if the communications path is between two vehicles and the country is slightly undulating. But a good VHF base site will overcome this problem.

HF suffers particularly in limestone areas because of absorption in the ground and because of the low power of the transmitter and inefficient aerial systems used. VHF is good on all these points.

Hilly country: VHF works very well as signals will bounce off hills and be reflected into valleys but like all radio systems dead spots will be found. Moving a few feet or yards will quite often restore communications.

It should be noted that the Country Fire Authority of Victoria and E.F.S. of South Australia have changed to VHF.

Area of coverage will vary from state to state but it will generally be found that a blanket coverage can be obtained for a radius of three miles using VHF regardless of the terrain and up to 15 miles with selected sites. I might add this is back to a base station. Car to car will need to be almost line of sight.

Access to an area will determine the type of equipment used. If vehicles can reach within easy distance of a cave entrance then the use of mobile radios is recommended. These can then take the role of a secondary base or relay station.

Portable sets are very effective for short distance communications, i.e. across paddocks, but can not be relied upon for longer distances.

Siting of the VHF Base Station radio. This is the most important link in a radio system as all control comes through it. It is very important to position it where the maximum coverage can be obtained. The aerial should be as high as possible so the top of a hill is the best position.

Operation of a radio telephone system

The P.M.G. issue the licence for operation and allocate the base call sign and frequency, e.g. V.S.A. has the call 3DM base.

This must be used by the base on each call and each mobile must call back to the base giving the mobile call sign and the base call sign.

Both C.E.G.S.A. and V.S.A. have chosen the phonetic alphabet as call signs for their mobiles with no overlap so that if mobiles are moved in from one area to another no confusion can result only the base call sign will change for the visiting mobile.

Therefore a mobile calling base will call Alpha calling 3DM base. The base would then answer 3DM receiving Alpha.

If both parties receive loud and clear then messages can be passed. Messages are completed when the base answers 3DM out.

Other mobiles can then call base.

Persons using radios should speak clearly and into the microphone and say *over* when their message is complete.

In a recent search and rescue exercise at Buchan the radio system consisting of a 10 watt base radio installed at our hut using a 50 foot mast with a ground plane aerial and five 10 watt mobile sets and two 27MHZ portables was used extensively to control personnel.

The base under the control of the S. and R. leader despatched four cars to selected caving areas. These vehicles were parked at positions where good reception could be obtained back to base. These then became local control stations. Each party was told that four blasts of the horn meant that they must return to their control car. They then commenced their search pattern.

In an area where a control vehicle could not get good reception a relay vehicle was available to bridge the gap but was not required and was then used as a messenger vehicle for supplies etc.

In an area where a vehicle could not gain access, two portable units were used; one left at the control vehicle and one with the party.

As it turned out this area was the one that the rescue took place in. The party reported back to the control vehicle the situation and the equipment required. The control passed this to the base who then recalled the remaining vehicles and directed them to the rescue area. The messenger vehicle brought the requested supplies. A telephone was then run into the cave and back to the portable radio thus completing the final link.

In conclusion from personal experience, VHF seems to be the best system.

Equipment is small and can easily be transferred from one vehicle to another. Aerials are more efficient and small in size and can be gutter mounted.

High power for the transmitters and a good base site all go to make a simple easy to operate and reliable radio telephone network for search and rescue.

DISCUSSION

- C *In the practice rescue that CQSS had on Limestone Ridge they had three parties with mobile radios from the police but they had also borrowed some from the Railway Department used on the coal trains. We were able to borrow five at once. They had three inside the cave which overcame any problems there.*
- A Their radios worked O.K.?
- C *They had no trouble at all.*
- A I have only tried one portable 10 watt unit in a cave and it worked very well. In fact over a distance of a quarter mile but that was only one instance.
- Q *What frequency were you using in that instance on your communications inside the cave? The citizen band 27 MHZ works well along a straight passage but it won't go through more than about 10 feet of limestone.*
- A I don't know what it is, I would suspect it is VHF.
- I The trouble is the higher the frequency, the less penetration. For cave communications you need the low frequency around 500 KHZ.

- Q *Were your portable transceivers the same frequency as the base units in your vehicles?*
- A No, they were 27 MHZ units.
- Q *Can you get the pair for the one frequency?*
- A Yes, but they cost about \$430.
- C The cost of these units is a bit less than the 27MHZ we are using. The other point is that it is often an advantage not to have them all on the same frequency. You get so much coming through that one base station can't handle the whole thing, and you have got walkie-talkies going plus your main unit. If you can separate them it is probably a good thing in many ways.
- Q *What are the prices of the units that you are using?*
- A I too work for a very good company.
- C *When you apply for these radios on the same frequency you stipulate on the application form the frequency you want explaining that your area is a country area and you are not going to use your radio in a metropolitan area.*
- A If people are considering this, it would be a good idea to standardise because each group can move into another area and we are all on the same channel. In places like the Nullarbor it all comes in handy. Strictly speaking it's illegal but this is beside the point.
- Q *Do you use these radios on a normal weekend's caving?*
- A Yes.
- Q *Is it also a consideration that the higher the frequency the less wattage you need for a given coverage?*
- A If it is line of sight the power does not matter. We try and work on line of sight as much as possible, but you are right.