

MEETINGS, NETS and SERVICES**Club Station:** VK4WIS**Club Repeaters:**

Maleny: VK4RSC on 146.850 MHz & 438.075 MHz.

Peregian Beach: VK4RMB on 146.825 MHz & 438.175 MHz.

Gympie: VK4RGY on 146.625 MHz & 438.825 MHz.

Bli Bli: VK4RSN on 53.700 MHz

General Meeting: Monthly on the first Tuesday at 7:30 pm in the Club House, old Toll Plaza building, 85 Godfreys Road, Bli Bli.

Visitors are welcome to attend.

Weekday Meeting: Weekly at 10:00 am on Wednesday.**80 m Net:** Weekly at 7:30 pm Thursday on 3580 kHz.

Conducted by club station VK4WIS.

Good Morning Net: Daily at 8.15 am at VK4RSC on 146.850 MHz.

Conducted by various club members.

Tech Net: Weekly at 8:30 pm Sunday at VK4RSC on 146.850 MHz.

Check in, raise topics and ask your technical questions.

6 m Net: Weekly at 7.30 pm Friday at VK4RSN on 53.700 MHz.**QNEWS:** Relayed Sunday at 9:00 am at VK4RSC on 146.850 MHz.

After the broadcast a callback is conducted by VK4WIS.

Internet: www.vk4wis.org

This website provides previous issues of Pelican Droppings in full colour in pdf format which can be downloaded.

The current issue can be had by subscribing to the email edition in pdf format. Apply to SCARC.

EchoLink: Available on VK4RSC 146.850 MHz.

The Internet station is VK4AKA-R and the node is #195107.

Pelican Droppings

Newsletter of the Sunshine Coast Amateur Radio Club Inc.

Issue No.79

August-September 2005

The club shack has a new computer
See page 2



Home-brew co-linear VHF antennas are not common these days. We hope to rectify that situation with a comprehensive description of one. Coming up too are some very interesting home-brew projects by members. We will report on them as soon as they make good progress.

NEXT ISSUE**Production Staff**

Geoff Combes VK4GWC, 201 Kirbys Road, Palmwoods. 4555 Editor

Tony Thorrold VK4KKY, Foreign Correspondent

Kevin Oakhill VK4COP, Distribution of hard copy.

Geoff Sanders VK4KEL, Distribution of pdf version by email.

Copy deadline: 2nd Tuesday of the month preceding GM issue.

Email: geoffcom@powerup.com.au**INSIDE**

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Address: The President, Sunshine Coast Amateur Radio Club Inc.
85 Godfreys Road Bli Bli Qld 4560



Presidential Preamble

What are we doing to promote our hobby? Have we told anyone what we do or how we enjoy ourselves? Have we mentioned to anyone how amateur radio assisted people during the recent tsunami? The recent hand-held radio day at work during lunchtime should have created some interest. Do you have any ideas on how we can promote amateur radio? If so please contact one of our committee members.

The club has written reports on "Broad Band over Powerlines" and the loss of part of the six metre band for FM digital broadcasting and sent them to the W.I.A., for forwarding on to the A.C.A.

Clubroom activity continues:

The "South Yarra" store has been reorganised again with more rubbish removed plus an extra bay of shelving and a solid table for Joe to use for sorting components. The rubbish placed in Harvey's trailer acts like a magnet to the "Bower Birds". We should charge \$50 per person to fossick in this glorious pre-used equipment.

The workshop area still needs to have bench space created for working on projects. Fitting some shelves above the main workbench for test gear would help create this valuable space. Maybe we should have a shadow board or slotted screwdriver rack donated. We cannot increase the floor area but we can go higher.

In the library, Max is still working hard at sorting donated books and magazines. More shelves and magazines have been placed in the room near the workshop door. Our library contains so much useful technical data that members could use, perhaps more than now.

At the second Sunday meeting at the clubrooms on the 19th of June, about eight people attended and we finished with the barbeque burned by Mike VK4YFL. The third Sunday meeting on 17th July had about seventeen people attending. It was beautiful to see Kevin VK4COP and Margaret and daughter, and grand daughter, stay for the BBQ lunch. Thanks to VK4TK for his effort in cleaning the kitchen floor. Remember the next Sunday meeting will be held on the 21st of August starting at 9:00am with a

Cover picture

Shown is the main component of the computer system recently built for the club's radio shack (commonly called the Green Room). Tony Worth and Damien Cook, the friendly guys from **NBTech Computers** of North Buderim, generously donated the case, hard disk drive and 50x CD ROM drive. Jim VK3UAV volunteered his talents in the assembly of the system.

Famous Personalities: Samuel Finley Morse

Morse (1791 - 1872) was born in Charlestown, Mass, USA. The son of a geographer and Congregational minister, Jedidiah Morse, young Samuel was not a good student. His only interests were painting and electricity. In 1811 he travelled to England to study art and on his return to the USA he earned his living as a portrait painter, later becoming president of the National Academy of Design.

In 1832 he overheard a conversation about the newly-discovered electromagnet and immediately had an idea that this could be the basis for an electric telegraph. His first working model was built in 1835 and although still earning his living as a painter, by 1838 he had invented the system of short and long signals now known as the Morse Code. After a long struggle he obtained funds from Congress to build an overhead line between Baltimore and Washington and in 1844 transmitted the first message, "What hath God wrought".

He was immediately sued by numerous rival inventors all claiming that they had first thought of the system, but after many legal battles he was granted patent rights in 1854. More and more telegraph lines were built in USA and Europe making Morse a very wealthy man and revolutionising world communications. Today he is remembered more for his excellent portraits of prominent American men than for his telegraph, except, perhaps, by radio amateurs!

In 1874 a Frenchman, Jean-Maurice-Emile Baudot patented a different code that eventually became more widely used than the Morse code. In Baudot's code each letter was represented by a series of five "on" or "off" signals which gives 32 different possibilities (2 to the power of $5 = 32$) which is sufficient for our alphabet plus punctuation marks. This type of code is well suited to modern digital electronics and more recent versions of the Baudot code use eight bits to give 256 possible combinations, allowing for upper and lowercase letters, punctuation marks, symbols and foreign letters.

End

Ponder on thiscontinued from page 13

But remember, when we counted the whole numbers 1, 2, 3, 4, ... we got to infinity. Now, with all these numbers in between 0 and 1 and in between 1 and 2 ..., does this mean that there is a "bigger size" of infinity to fit all the other numbers into? The surprising answer is "Yes!" There are bigger and bigger infinities called "Alephs" ($\aleph_0, \aleph_1, \aleph_2, \dots$).

Mathematics is a rich and deep subject for us to exercise our minds. End

Solar Panels

by Tony Thorrold Vk4KKY

We have all seen solar panels, or to give them their technical name Photovoltaic (PV) Cells, but do you know how they generate electricity?

The photovoltaic principle was first discovered by a French physicist Alexandre Edmond Becquerel in the 1850s and the first modern PV cell was invented in 1954 by Chapin, Fuller and Pearson, a team of scientists working at Bell Laboratories. It had an efficiency of 6%, ie. 6% of the energy of the sunlight falling on the cell was converted to electricity.

Electrical conduction in silicon is the result of the movement of electrons (negative charges) and holes (positive charges). During manufacture, the silicon can form an n-type, or a p-type semiconductor depending on which impurity is added to it. N-type has an excess of Negative electrons, while P-type has a lack of electrons, ie. excess Positive holes. If a p-type layer of silicon is joined to a n-type layer, a p-n junction is formed. The junction creates a gradient of electric potential within the crystal.

By making a p-n junction with very thin layers of silicon and shining sunlight on the cell, some of the photons of light will be absorbed in the region of the junction and their energy is transferred to the electrons, freeing electrons in the silicon. If the photons have sufficient energy, the electrons will be able to overcome the electric field at the junction and move through the silicon and into an external circuit where a dc current will flow.

Commercial cells with an efficiency of about 18% are either made from very thin slices of a single crystal - the monocrystalline variety made for example by BP, or from slices of randomly grown smaller crystals - the polycrystalline type eg. Solarex. The polycrystalline type are less expensive to manufacture, but do not perform as well in hot climates. The best cells today are made from gallium indium phosphide and are normally used in satellites. They have an efficiency of about 32%. The output of a cell can be increased by concentrating the light with lenses or mirrors.

PV cells are used in many different applications. Tiny ones generating only milliwatts power our pocket calculators, while in 1992 a bank of cells was installed in Davis, California producing 479 kW which is still powering 124 homes. In 2001 NASA's *Helios* flying wing aircraft claimed the altitude record of 29 410 metres for propeller driven aircraft. It was powered by 65000 thin-film PV cells, generating 35 kW that drove 14 propellers.

End

monthly General Meeting held during the morning. Bring your own or cook your own lunch.

The radio shack (Green Room) has transceivers operating on the following bands: SES, 70cm, 2 metres and HF. The latter uses a three-band trapped dipole on 20/15/10 metres and a brand-new G5RV for lower bands. A new bench on wheels is being made and will probably be painted green. Maybe one day we will have the use of an 80-metre loop.

The weekly nets need to be supported by members. This now includes our new 10-metre ssb net on 28.470 MHz held weekly at 8:15pm on Wednesday nights. Please try to put out a call and don't worry about cross-polarisation of antennas as both horizontal and vertical polarisation are being used. The 2-metre net on Sunday 7:30pm is now on 144.300MHz. Net controllers are using both horizontal and vertical antennas here as well.

Remember that members can use the club web site to read and download back copies of this newsletter.

The next club night meeting is on Tuesday 2nd of August 2005 at the clubrooms. Remember the General Meeting is on Sunday 21st of August. At the 6th of September General Meeting, the committee is proposing a fee increase of \$0.10 per week per member. Come along and have your say at this meeting.

That's enough from me.

73 all, Ray



The latest addition to the workshop is extensive shelving for storing test instruments and equipment. The bench top remains as untidy as ever; perhaps the sign of a busy place. Or maybe there is another reason.

A Toaster Oven in the Radio Shack?

By Frank Winter VK4BLF

More and more amateur radio projects are using SMD (Surface Mounted Devices) in their designs. The advantages are fewer parasitics in RF sections and, of course, denser construction methods. A project that might have been the size of a house brick can now be mounted in a little zippy box.

So what does that have to do with a toaster oven?

The problem with SMD devices is that conventional soldering techniques are difficult to use. The resistors, capacitors and ICs are tiny and, unless you are very careful, they either go up in smoke or attach themselves to the iron. This makes it hard to solder them to the PCB. Professional service people use expensive hot air pencils that avoid direct mechanical contact with the chip. This works but unless you can control the airflow or glue the chips to the PCB, the component can literally blow away to be lost forever.

Another way of soldering SMD components is to use a Reflow Oven, which is basically a box which heats and cools PCBs and their components in a controlled way. Manufacturers of SMD devices provide ideal Temperature Profiles for use in Reflow Ovens to make satisfactory solder joints. These profiles are readily available from manufacturers.

If temperature profiles can be reproduced without spending thousand of dollars, the task of soldering many of these tiny components is possible for the radio amateur. Well, it turns out that a readily available toaster oven can do that quite simply. Its insulation and heating characteristics make it easy to produce the required temperature profile. And all that for just under \$30! Lucky, isn't it.

At the time of writing, department stores sell them under the brand name of MISTRAL (Mistral International Pty Ltd, 324 Frankston-Dandenong Rd, DANDENONG South, Vic 3175 Tel 1300 363 907). This model is shown in Fig. 1. It has two 650W ceramic heating elements in series and also features automatic temperature control. This latter feature is not necessary for reflow soldering but comes in handy when you re-heat a pizza. This heater has the important characteristics of thermal insulation and high power, all in a small box. Other brands may well be suitable for use as Reflow Ovens as well.

So how does it work? To start, apply solder paste (now readily available from major electronics stores) to the copper pads – a little dab will do. Next, place the components on the board and make sure they are in the right position. On a dense board this can take a while but there is no need to hurry, the solder paste remains workable for about 10 hours before it dries. When all the SMD components are placed, put the board in the oven. The natural

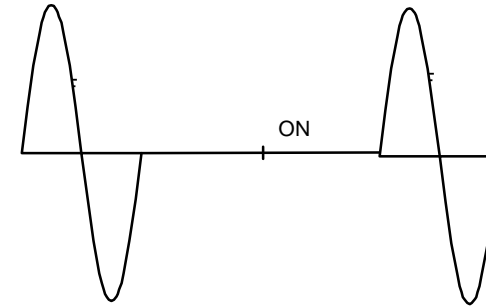


Fig.3 One third power: One cycle on; two cycles off; zero crossing

A different way of controlling power that overcomes this problem is called “zero crossing switching”. Here the power is switched on or off for whole numbers of half cycles - the circuit is only switched off when the current has reduced to zero near the point where the sine wave crosses the zero axis and it only switches on when the voltage is zero. For example, for one third power, the current would be on for one cycle, off for two cycles, on for one cycle, off for two cycles. This is shown in Fig 3 above. End

Ponder on this

Consider how we count. If we count up in whole numbers, the series is 1, 2, 3, 4, Given enough time, we could continue counting to as large a number as we can think of. However large the largest number is that we reach, we can always add 1 to it to make a bigger number. There is therefore an infinite series of whole numbers from 1 to infinity.

Having counted the whole numbers, what if we decided to count all the square numbers, e.g. 1, 4, 9, 16, 25, 36, ... To our astonishment, we would find that there is also an infinite number of squares. But then what about the numbers in-between the squares, such as 2, 3, 5, ...? In fact, there are more of these “in-between” numbers than there are squares!

But then there are also the fractions! What about all the fractions just between 0 and 1 like $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, $\frac{7}{8}$, $\frac{27}{38}$, $\frac{476}{943}$... ?

Then there are the irrational numbers such as the square root of 2 (1.414213562373....), or Pi (3.14159....), which cannot be expressed as a ratio of one number divided by another. It is a fact that there are more irrational numbers than whole numbers plus fractions! They have to be fitted in between the fractions. There is an infinite quantity of numbers just between 0 and 1. Similarly, there is also an infinite quantity of numbers between 1 and 2 and also between 2 and 3 and so on. Cont. on page 15

The Silicon Controlled Rectifier (SCR)

A Pelican Droppings Tech Review

SCRs, also known as Thyristors, are electronic switches. The symbol for a SCR is like a diode with an extra terminal, the gate, as shown in Fig 1.

SCRs have the following properties:

- With no bias on the gate, the SCR is open circuit between the anode and cathode.
- When a positive voltage is applied to the gate, the SCR acts like a normal diode, conducting in the forward direction, but not in the reverse direction.
- When the SCR is conducting in the forward direction, the gate loses control.
- A conducting SCR can only be turned off by reducing its internal current to almost zero. It cannot be turned off using the gate.
- Gate bias has only to be applied for a few microseconds to turn the SCR on, but it takes a few tens of microseconds to turn off.

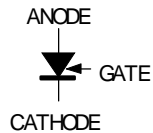


Fig.1 SCR symbol

SCRs are versatile devices which can be used in many different applications, but in industry they are most often used as variable power devices in AC circuits. When a SCR is used in an AC circuit, it needs to be switched on every half cycle since the current flowing through it reduces to zero every time the sine wave crosses the zero axis. If the gate is pulsed on at some time after the zero crossing, only part of the sine wave will be present, as shown in Fig 2, and the average power fed to the circuit will decrease. The later in the cycle the SCR is turned on, the less the average power will be. A familiar application of this principle is a light dimmer.

Unfortunately, chopping the wave up like this causes harmonics to be generated which in turn cause electrical noise. When switching hundreds of amps, the interference can be very serious and can cause frightening problems in other equipment connected to the same part of the power grid.

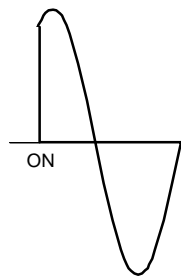
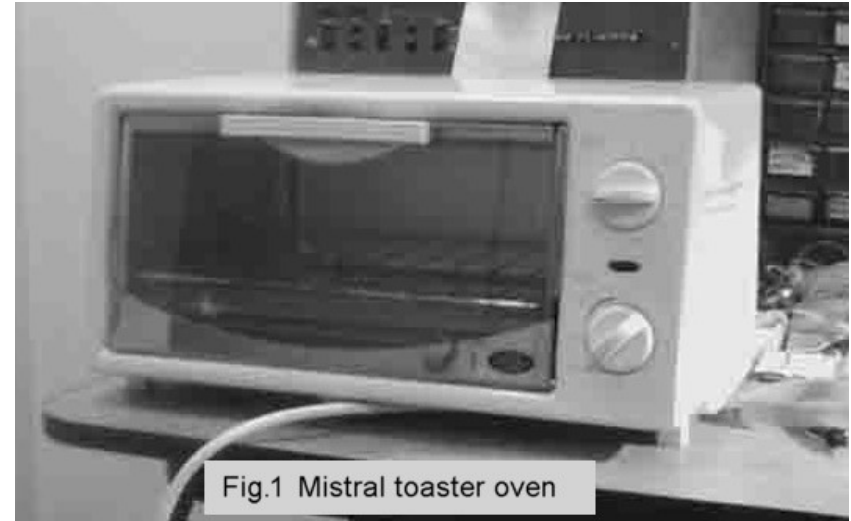


Fig.2 Switching on after zero-crossing



adhesion of the solder paste is enough to keep them in place, so long as the board is handled carefully.

To begin the soldering procedure turn the oven to full and wait until the temperature reaches 80C then turn the oven off. The temperature will continue to rise to about 100C. Leave it at that temperature for about two minutes. This part of the procedure is called soaking, and it is necessary to reduce thermal stress between metals and plastics in the components for the next step. It also dries the solder paste and releases solvents from the paste.

Next, turn the oven on to full and carefully watch the temperature. When it reaches about 140C you can see the solder paste melting and sucking itself into the joints. Let the temperature continue to rise to about 180C to complete the reflow step. When that temperature is reached, immediately turn the oven off and open the door fully. Leave the board in the oven so it cools down slowly.

This procedure produces almost the ideal temperature profile recommended by most component makers. It is however wise to check with manufacturers on the internet before you reflow any rare components. With practice comes experience and you will be able to tell which components need special treatment.

The temperature profile shown in Fig.2 on the next page displays the profile produced by the procedure just described. It was recorded in 1 second intervals with a digital multimeter connected to a computer and a thermocouple to measure temperature.



Fig.3 Frank Winter VK4BLF (centre) demonstrates SMD soldering using a toaster oven. Looking on from left-to-right are Harry VK4TK, Chris VK4UTT, Kevin VK4WOT and Jim VK3UAV.

I have been interested in using SMDs for some time but the impetus to do something about soldering them came with the formation of a small SCARC group to build “Scotty’s Spectrum Analyzer”. A large number of

components use SMD format and a way of soldering the boards easily and surely had to be

“Everybody was most impressed, so much so that three SCARC amateurs bought their own oven.”

found. The toaster oven is just perfect for this.

Initially, people could not believe it was so simple – surely there must some catch. To dispel these doubts I decided to demonstrate my “new soldering iron” to some SCARC members at one of our Sunday meetings. Everybody was most impressed, so much so that three SCARC amateurs bought their own oven (see photo in Fig.3 above).

I can’t claim that I came up with the idea. Using a toaster oven with an expensive temperature controller has been around for some time on the internet, but it really works without any elaborate control other than human

The Power of RF

by Harry VK4TK

Every now and then we hear of RF doing some strange and unexpected things. Here are a couple more events that happened in my home recently. Event 1: During a DVD recording session that I was conducting in the shack I decided to call the 6 metres FM repeater using my hand-held transceiver. The recorder drive promptly ejected the CD part way through the session, failing to complete of course.

Event 2: At a time when I was transmitting on 80 metres with 100 W my daughter complained about the strange behavior of her bedside touch lamp. Seemingly of its own volition, it turned on, stepped through its several levels of brightness and then turned off. End

[Readers, please let me know of your own experiences with the power of RF. Recently I saw on TV an interview with Australian-born astronaut, Andy Thomas, who was about to go on his last shuttle journey. When asked to explain his motivation for making this final trip, he replied that it was all about “discovery”. This breathtaking snippet of information and Harry’s anecdotes on the power of RF combined to lead me to draw the cartoon below. It’s pretty silly; put your own meaning to it. Editor]





Relic of WW2 - a Russian shell

Transportation was supplied by horses that soon expired under the heavy work load and extreme weather conditions. The tanks were only able to operate when the weather warmed up a little.

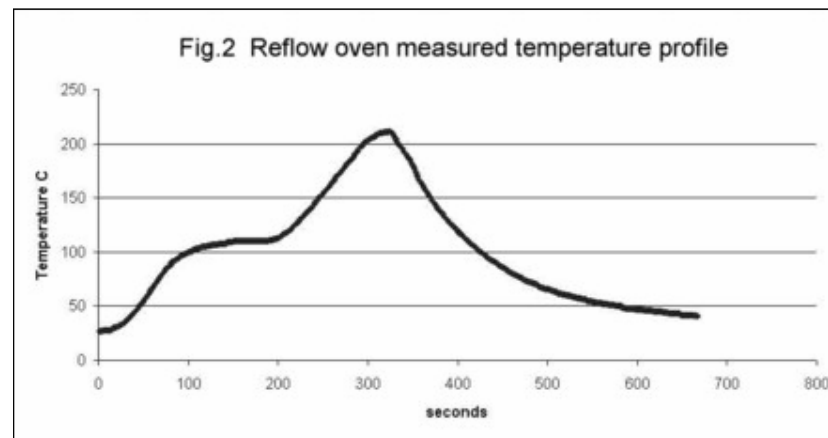
On the second day we visited the sights around Viborg where the Finnish troops stopped the Russians from getting over the Viborg bay. This took place in June of 1944. It was here that a Russian shell stunned our guide Kurt, but fortunately he suffered no serious injuries. The Russians were superior in manpower, but the Finns did the job at hand, not waiting for orders from distant headquarters. Perhaps that explains why the Finns were able to stop them.

We were all pleased to get back home after an interesting three days in Russia. End

Computer Tip 5 – Conditional Sum Wizard

A very useful facility in Microsoft Excel is the Conditional Sum Wizard. This enables Excel to perform a calculation only if certain conditions are true. For example, it could tell you how many entries in your log were from Mongolia (JT) and had a signal strength greater than S3. Or the sum of all values in a column which are greater than \$15 and were spent in Victoria.

To install, click on “Tools”, “Add-Ins”, tick the Conditional Sum Wizard box and click “OK”. To use, click “Tools”, “Conditional Sum” (Excel 2000) or “Tools”, “Wizards”, “Conditional Sum” (Excel ‘97) and follow the instructions. End



input. The whole procedure takes less than five minutes once you have spent hours placing the tiny SMD chips. The solder method described here makes building ham radio projects with surface mounted devices quite possible, given care and a little practice. In particular UHF and SHF devices benefit from using this construction technique. End

WICEN REPORT—Emergency Procedures

by Ray Stuart VK4YRS

One of the following co-ordinators will be on duty for four-hour periods:
VK4NW, VK4ARS, VK4SY, VK4YRS.

1. All reporting by SCARC/WICEN members to the co-ordinators is to be via amateur radio frequencies, i.e. two metres and seventy centimetres.
2. When 146.850 and 438.075 duplex repeaters are operating they are to be used with 146.625 at Gympie as a back up. Should they fail then simplex frequencies are to be used on 146.850 and 438.075, with back up simplex frequencies 146.500 and 439.000. The Brisbane linked Wicen repeater on 438.125 is to be used for Wicen use only during Emergencies.
3. SCARC/WICEN members and other amateurs may use any other non-WICEN frequencies for non-essential traffic.
4. The following Evacuation Centres (with UBD map refs) will need to be manned by a portable operator:

Alexander Headlands Conference Centre Off Mari 69P16
Apex Youth Camp Nojoor Rd. Mujimba 59H20
Luther Heights David Low Way Pt. Arkwright 9L2
Buderim Mountain School Main St Buderim 78J3

Operators are to take their own transceivers and antennas. Volunteers are required at these centres: please contact the writer if you are able to assist.

Viborg Re-visited, 65 years on

by Jan Esselstrom OH6GYO(ex VK3ZUE)

Recently thirty six curious travellers took a bus trip from Jakobsburg in Finland to the town of Viborg, now part of Russia. Our interest was discovering places where Finland had been re-shaped into its modern boundaries after World War 2. We were all very much aware that, if the Finish army had not won those battles so long ago, things would be very different today. Some of the travellers were sons and daughters of the original soldiers. Our elderly guide, Kurt West, was a veteran of the 1939-40 winter war.

Once we had crossed the Finnish border into Russia, I began thinking "What am I doing here?" We drove on towards Viborg, an old Finnish city lost to Russia during the war. It is reputed to have been one of Finland's most beautiful cities, but today the buildings still standing look a little old and tired, with what remains of their original paintwork almost gone.

We stayed in a 20 year old Finnish-built hotel, which had seen no maintenance since it was constructed. The waitresses would appear to have never had any training on how to serve tables, as the food was slammed down in



The old Finnish city of Viborg at the end of the Gulf of Finland, Baltic Sea
It is now part of Russia.

front of us, coming from all directions. On our first day, we visited the site of the winter battlefields of 1939-40. Today there are no big trees left, as they were all destroyed by Russian artillery fire. In the area of the Finnish

bunkers, the artillery literally blew roads through the forest. We

"Thirty six Finnish soldiers died in the Vora bunker as the result of a direct hit by an artillery shell."

paid special attention to the Vora and Larsmo bunkers, where so many of our party lost family members. Thirty six Finnish soldiers died in the Vora bunker as the result of a direct hit by an artillery shell. A further twenty six soldiers died in the Larsmo bunker when it collapsed under the weight of a Russian tank.

Immediately after the war, the Finns retrieved the bodies of their dead, however the remains of many Russian corpses were not removed until the early '70s. Today there is still a lot of war rubbish lying around - old shells, gas masks, barbed wire, etc. Many of the bunkers are still in good condition after 65 years. The winter war had temperatures of -40C, which made the use of motorised machinery almost impossible. (continued next page)



A modern Russian armoured car