



MARL



Magazine by MARL

For Maltese and Gozitan

Radio Amateurs

Number 7

April 2006

## Smoking is Prohibited



**at the Centre**

**From the Editor**

Friends,

I welcome you to another edition of this magazine for April 2006.

I wish to remind you that we had asked you to take part in this magazine by sending us your contributions.

We are not asking for monetary contributions, although such contributions wouldn't be refused.

We are asking you for articles about apparatus you have constructed, stations that you have worked, how was propagation from your end, and other things related to our hobby.

We also want to know any stations that you have worked for the first time from Malta, that is, the first time there has ever been a QSO from Malta on a particular, band, mode etc.

Come on those who work moonbounce, meteorscatter, tropo etc. We want your details for historical purposes. And we want details of all bands and modes.

We have received some articles, but like Oliver Twist, we want some more. The reason is that the more people taking part in this magazine the more it will be varied and be for your tastes.

From our end we will continue to do our utmost not only to bring you the best articles that we can, as well as continue to encourage others to take up our

hobby, but also to get other things for Maltese radio amateurs as we did for the early extension of the 7Mhz band.

Lawrence

**Thanks**

The MARL Committee would like to thank the Texas DX Society for their donation of an 80 Metre Sigma Force 12 vertical dipole to MARL following their expedition in Malta.

This vertical dipole is intended to be used for portable operation, so we are sure that it will be used in portable operations on the low frequencies together with the 160-metre dipole previously donated to MARL by the Netherlands expedition team.

We hope that our members will make more use of our apparatus and antennae, including 80 metres, and we again thank the Texas DX Society for their generous donation.

**Cleaning of MARL Centre**

The Committee wishes to thank 9H1SP Paul, 9H1PI Ivan, 9H1TM Mario, 9H5RL Ronald, 9H5IR Norbert, and Charlie SWL for their initiative to clean and repair the Club boundary wall.

While thanking them, we encourage our members to come more often to the Club and for others to give a helping hand to make the Club better than it presently is.

On the same lines, the Club will be be much better if all those who say what should be done take the example of our colleagues and makes something himself and be an example to others.

We also remind you to send us your e-mail address so that we may send you the magazine, although this is always put on our website.

Your e-mail address also serves to inform you of any news that we may have and also activities that we will be organising.

Therefore send us your e-mail as soon as possible so that we may have a complete list.

We also remind you that we had also asked you if you wanted us to publish your details in any publication which we may make.

A lack of answer from your end will be taken to mean that we have your agreement and consent and the details that we will publish will be those found on the internet unless you inform us of any changes.

### **The Danger Continues**

In the last edition of this magazine we warned you about the new danger for our hobby because of commercial interests who want to send internet signals on electricity cables.

We had also brought to your attention to an e-mail sent by the RSGB EMC Committee on changes which the Commission of the European Union want to make in its magnetic compatibility Directive.

We had brought to your attention about how our country had agreed to and voted in favour of these changes without making any comment, while the big countries with more capacity, studies and information had voted against.

There is now again a threat to our hobby because commercial interests never give up and always continue to try to get their way.

In fact, we have received another e-mail about studies conducted on tests that were held in Germany where a system using telephone lines was tested, but which was proved to make massive interference.

We have downloaded these study reports and saved them so that if they vanish from the internet we will have a copy.

These reports were not intended to be known to the general public, but someone managed to acquire them and pass them on to radio amateur organisations.

We assure you that when you see these reports you will realise why we told you that there is a serious threat to our hobby from commercial interests if such a system is allowed to be used.

These reports can be downloaded from the following webpage which also has other links for these studies.

The majority of these reports are in PDF, but there is also a power point presentation.

<http://www.ofcom.org.uk/static/archive/ra/topics/interference/documents/dslplt.htm>

We encourage you to download these reports without delay and see the danger that this system creates for our hobby.

As we have told you, if these reports vanish from the internet pages, we have a copy and you can be given a copy, but we suggest that you download them as soon as possible.

### **ARRL**

Further information was also published by the ARRL on its website on 4 April 2006 regarding BPL operations in the USA, which information is found on the following link.

<http://www.arrl.org/news/stories/2006/04/03/100/?nc=1>

It was reported that according to FCC statistics, the BPL market share was miniscule when compared to other operators.

According to the statistics, there were only 4872 business and residential "Power Line

and Other” subscribers that deliver speeds greater than 200kbps in at least one direction.

The total number of high-speed lines for all technologies is 42,866,469, resulting in “BPL and Other” at just over 0.01%.

Residential BPL ‘advanced services’ lines greater than 200kbps both ways is just 3916 from 34,259,411.

The fact that the figures refer to “Power Line and Others” means that the actual number of BPL subscribers is lower, since the numbers also include “other” technologies that are not specified.

The number of subscribers and the speed attainable with BPL is certainly not worth the enormous interference that BPL creates on all frequencies from 2 to about 80 Mhz or more.

Let’s hope that no one in Malta ever thinks of using BPL or PLC as it is also known, in Malta.

However, we will be ready for it and will fight any introduction of such interference generating technology in Malta.

Otherwise, it would be the end of our hobby and also interfere with all other services on the mentioned frequencies, including ship and aircraft security and other safety services.

We hope that the Maltese authorities will be wise enough not to allow any operator to introduce such systems in Malta.

This is due to two press releases issued on 19 May 2004 by the Department of Information about the opening of the annual conference held by the Malta Communications Authority.

In press release 826, it is stated that the Minister for information Technology and Investment said about broadband technology that,

**“It does not really matter to us whether that is carried over phone lines, over**

**cable, over power lines, over mobile devices, through satellites, through wireless networks: if you find a way of doing it, it doesn’t matter if you deliver it through the water supply.”**

**As long as your solution is within the regulatory parameters that we will on agree on, the cheaper, the safer, the more reliable your technology is, the more we will welcome it.**

In press release 827, it is stated that the Minister for Competitiveness and Communications had said that,

**“Government is already considering the appropriate policies for new broadband technologies - power line & fixed wireless access. In fact with reference to fixed wireless access, the spectrum is already available for multiple fixed wireless access operators.”**

We should therefore keep ourselves well informed and be on the alert because someone might try to introduce a BPL system.

This is despite the fact that in other countries, especially in the USA, the few systems that are being tested are being closed in view of the interference they are causing, the few subscribers, and because other systems have much higher speed than BPL or PLC.

The FCC report may be downloaded from the following link, although we have a copy in case the report disappears from the internet.

[http://hraunfoss.fcc.gov/edocs\\_public/attachmatch/DOC-264744A1.pdf](http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-264744A1.pdf)

Download it and keep yourselves well informed in your own interest and in the interest of our hobby.

## **Further Danger**

As if this is not enough, we have further bad news regarding spread spectrum use by other services.

This is due to an hf track-to-train transmission system proposed by Siemens in 1996 using spread spectrum on a centre frequency of 6.78Mhz. This was called Euroloop.

This system was not considered as a long-term solution or that it would be widely adopted as it was to be replaced by a GSM-R based communications system. On the other hand, GCE/Alstrom proposed a microwave system as its competitor.

Some years later, it was found that Euroloop needed to work on a higher frequency to avoid interoperability problems with another system called Eurobalise, which used a 6.5Mhz wide spread spectrum centred on 4.24Mhz.

There is now a proposal for the Euroloop system to operate to operate as a spread-spectrum system between 9 and 18Mhz centred on 13.5Mhz.

It is not intended to enter into the technicalities of the system, but it operates on magnetic field coupling from terminated leaky coax cable with a length varying from 300 to 1000 metres.

The potential effects of this system to other users through ionospheric propagation and on those living near railway lines is being investigated by IARU which found that about 1.2% of radio amateurs would be affected.

Although we do not have trains, it would still affect us since we may not be able to communicate effectively with stations near railway lines and also through ionospheric propagation of its signals causing interference at great distances. We are therefore also keeping ourselves updated with the latest developments on this system.

## **Propagation**

Presently we are at the minimum of the solar cycle, and one could think that there would not be good propagation on high frequencies.

This may lead us not to search especially on 21, 24 and 28 Mhz to see if there are any stations with whom we can talk.

In fact we may be losing stations stations if we do not search or call ourselves, because of everyone is trying to listen and no one is calling no one is going to hear anything.

Such an example is when last Friday 7 April I searched on high frequencies at 9.00 in the evening, and on 28 Mhz there was the beacon LU1FHH on 27.197 Mhz. This signal was still there up to 10.00 in the evening local time when I had to switch off.

Although the signal was not strong, I tried to call in the CW section further down, but no one answered because it appears that no one was thinking that there would be good propagation especially at that time because of the reasons previously mentioned.

Although nothing may be heard, it would be better to give a call because it could be that many may be listening while no one might be calling.

On the other hand, propagation on the low frequencies is good and one can find dx stations, sometimes even rare ones.

This also applies to frequencies where one may find beacon stations which transmit so that ships and aircraft can find their position by finding the direction from which their signal is coming.

Normally one doesn't receive these stations from great distances, but when I tried to see what stations could be found coming in on 4 March, I succeeded in hearing GAG from the UK on my old CR100 (B28)

This was at quarter to nine in the evening local time on a frequency of 368kHz. This was apart from other stations that were also coming in at good strength.

Therefore, whoever is keenly waiting for us to have permission to use 136kHz should feel encouraged since it also

appears that we may also be able to have normal CW QSO's outside Malta apart from using computer programmes when the propagation is good.

## News

Dwar il-500khz u l-5Mhz ghalissa m'ghandniex ahbarijiet ghax ghadhom lura hafna. Madankollu ghandna xi nghidulkom dwar il-136khz u s-70Mhz biex taraw li ahna mhux qed norqdu, imma qed nigbru l-informazzjoni kollha possibbli halli nkomplu nippruvaw niksuhom minghand l-awtoritajiet kompetenti Maltin.

## 0 to 9khz

You should know that frequencies between 0 and 9khz are also not allocated in Malta.

These frequencies are so low that normal efficient antennae that we use on higher frequencies cannot be made by anyone for these frequencies.

In fact, a system used by some experimenters is by inserting a number of earth rods separated by a few metres and the signal is sent through them. In this way the earth is used as the medium for delivering the signals.

There is no need for any permit or licence for such systems, because you will not be radiating a radio signal on the air from an antenna. You will only be sending an audio frequency signal through the earth itself.

However, we wanted to be granted permission so that we could experiment by using antennae and radiating signals on radio frequencies, although very low frequencies.

Although we have made this request the answer was that although these frequencies are not allocated, scientific experiments can be made although not by radio amateur stations.

As if radio amateurs do not conduct scientific experiments and were among the first persons to make important scientific discoveries.

However, we will see if in the future we may succeed in obtaining at least a small part of this spectrum which offers challenges that are not found on other frequencies.

Until then and if we succeed, who knows when, whoever wants to experiment on these frequencies can use the system mentioned above, that is earth rods because in this way he will not be radiating any radio signal on the air.

## 136 khz

Regarding this frequency, I have researched and downloaded a number of national frequency plans of a number of countries.

From these plans, it results that the following countries gives the 136khz frequency, that is, between 135.7khz and 137.8khz to their radio amateurs.

<b>3A</b>	Monaco
<b>5B4</b>	Cyprus
<b>ZC</b>	Cyprus (British Bases)
<b>6O</b>	Somalia
<b>9A</b>	Croatia
<b>C3</b>	Andorra

### Portugal, that is

<b>CT</b>	Portugal
<b>CT3</b>	Madeira
<b>CU</b>	Azores

<b>DJ eèè</b>	Germany
<b>EA</b>	Spain
<b>EI</b>	Irish Republic
<b>ES</b>	Estonia
<b>EU</b>	Belarus
<b>F</b>	France

### UK, that is

<b>G</b>	England
<b>GD</b>	Isle of Man
<b>GI</b>	Northern Ireland
<b>GJ</b>	Jersey
<b>GM</b>	Scotland
<b>GU</b>	Guernsey & Dependencies

<b>GW</b>	Wales
<b>HA</b>	Hungary
<b>HB</b>	Switzerland
<b>HB0</b>	Liechtenstein
<b>Italy, that is</b>	
<b>I</b>	Italy
<b>IS</b>	Sardegna
<b>IT</b>	Sicily
<b>LA</b>	Norway
<b>LX</b>	Luxembourg
<b>LY</b>	Lithuania
<b>LZ</b>	Bulgaria
<b>OE</b>	Austria
<b>OH</b>	Finland
<b>OK</b>	Czech Republic
<b>OM</b>	Slovak Republic
<b>ON</b>	Belgium
<b>OX</b>	Greenland
<b>OY</b>	Faroe Islands
<b>OZ</b>	Denmark
<b>PA</b>	Netherlands
<b>R, UA</b>	Russia
<b>S5</b>	Slovenia
<b>SM</b>	Sweden
<b>SP</b>	Poland
<b>SV</b>	Greece
<b>TF</b>	Iceland
<b>YL</b>	Latvia
<b>ZB</b>	Gibraltar
<b>ZS</b>	South Africa

Other countries which have authorised their radio amateurs with special permits are,

<b>LU</b>	Argentina
<b>VK</b>	Australia
<b>VE</b>	Canada
<b>W</b>	USA ( <b>WL, KL</b> )
<b>ZL</b>	New Zealand

In fact, New Zealand radio amateurs have 130 to 190khz. They also have frequencies between 26.950 to 27.300 Mhz that are used for telemetry and remote control.

They also have from 614.00 to 622 Mhz, as well as 921.00 sa 929.00 Mhz apart from the other frequencies that radio amateurs in other countries have.

Canada had also made a proposal which was accepted by the World Radio Conference 2003. This World Conference decided to put a proposal on the 2007 Agenda of the same Conference that states,

*1.15 to consider a secondary allocation to the amateur service in the frequency band 135.7-137.8 kHz*

Although this Copnference is going to be held next year, we hope that we will not have to wait until this Conference decides about this proposal before the Maltese authorities gives us this frequency because as you can see there are already a lot of countries which have given this frequency to their radio amateurs.

## Contacts

Earlier on this month, attempts were made to make contact between Canada and New Zealand. The call sign used was VA7LF, while on the New Zealand end it was ZM2E.

Because of the distance between stations, they used a DFCW90 andDFCW60 system. This is a system where the dot and dash are separated in frequency by 0.1 to 0.5 hz.

They succeeded in hearing each other's signals, but have not succeeded in completing communications, i.e. a QSO. Although they have not yet succeeded, they are going to continue with their attempts.

## 70Mhz

Regarding this frequency, we had already told you that the answer was that this is allocated to other services and presently cannot be given to other services.

We had previously told you that several countries had given this frequency to their radio amateurs.

According to the RSGB news webpage of 10 March 2006, Monaco radio amateurs have also been given this frequency, that is, 70Mhz to 70.5Mhz. This was also confirmed by Claude Passet, 3A2LF by e-mail to Practical Wireless.

There are presently 5 stations in Portugal that have been also licensed to use 70Mhz, although their frequencies are different from the rest of those granted in other countries.

They have been given frequencies between 70.60625 Mhz and 70.63125 Mhz, although they may later be changed to coincide with those of other countries.

Presently there are already 5 stations which are,

- CT1HZE** Aljezur – Algarve
- CU8AO** Santa Cruz das Flores – Açores
- CT1FFU** Caldas da Rainha
- CT1FJO** Santarem
- CT1JAD** Carvoeiro – Algarve

On the other hand, through an e-mail by Jacquot sent on Saturday 18 March, LX1JX informed everyone that Luxembourg radio amateurs were also given frequencies on 70Mhz, and for the time being were given 70.150 Mhz to 70.250 Mhz as from 13 March 2006.

Through another e-mail from Greece of 14 March 2006, Costas, SV1DH said that the Greek Administration is very shortly going to give 70 Mhz frequencies to radio amateurs.

Presently, the frequencies will be between 70.2 Mhz and 70.25 Mhz, which frequencies may also be used by foreign radio amateurs in Greece.

In the same national frequency plans that I have collected re 136khz we also find useful information about 70Mhz that I have used for the following table that is found further down.

We remind you that this frequency may be used by radio amateurs in these countries.

- 3A** Monaco
- 5B4** Cyprus
- ZC4** Cyprus (British Bases)
- 6O** Somalia
- 9A** Croatia
- AP** Pakistan

**Portugal, that is**

- CT** Portugal
- CT3** Madeira
- CU** Azores

- EI** Irish Republic

**UK, that is**

- G** England
- GD** Isle of Man
- GI** Northern Ireland
- GJ** Jersey
- GM** Scotland
- GU** Guernsey & dependencies
- GW** Wales

- LX** Luxembourg
- OX** Greenland
- OY** Faroe Islands
- OZ** Denmark
- PA** Netherlands
- S5** Slovenia
- SM** Sweded (Beacon)
- SV** Greece
- YU** Yugoslavia
- ZB** Gibraltar'
- ZS** South Africa

Finland (**OH**), Sweden (**SM**) and Poland (**SP**) are also waiting to be given this frequency, while they have a beacon in Sweden.

Apart from these, according to information that I have collected from the 4 metre website <http://www.70mhz.org/index.htm> there is also a beacon on Ascension Island on the frequency 75.300MHz, which beacon has the callsign ZD8DUB.

The information about Luxembourg, Greece and Portugal as well as Monaco is also found on the website mentioned above.

According to his website, Luxembourg radio amateurs were given this frequency from 13 March 2006, and Monaco from 26 January 2006.

We remind you that radio amateurs in the UK have been given this frequency since 1956. So we are more than 50 years behind the UK in this matter.



As always we will continue to make representations with the authorities to try to get this frequency for Maltese radio amateurs.

What are the authorities waiting for so that perhaps we will not be the last people in the world to be given this frequency?

## **Somalia**

There is no doubt that some consider Somalia as a Third World country in view of certain problems that it has.

However, I am going to give you some information and a few frequencies which SARFEN, the national Radio Amateur Organisation succeeded in acquiring for radio amateurs.

When you see the following information you start asking, at least where radio amateurs are concerned: If Somalia is considered as a Third World country, what can Malta be considered to be?

You can find these details on the internet link

<http://www.somaliahamradio.8k.com/>

Free licence for life for radio amateurs

Free licence for foreign radio amateur visiting Somalia

Transmitter power output of 3 KW

### **New frequencies:**

0 to 9 khz  
70 to 76 khz  
133 to 139 khz  
165 to 190 khz  
495 to 505 khz  
5.210 to 5.410 Mhz  
26.1 to 27.995 Mhz  
70 to 70.5 Mhz  
220 to 225 Mhz  
575 to 585 Mhz  
614 to 622 Mhz  
902 to 927 Mhz

Further comments would be superfluous.

You should know that frequencies between 0 and 9khz are also not allocated in Malta, and we are therefore going to ask for these frequencies to be allocated to us.

We do not expect to be given frequencies between 220 to 225 Mhz and 575 to 927Mhz, because they are allocated to other services in Europe such as television, while frequencies between 26.1 sa 27.995 Mhz are allocated as a citizens band, but we expect to be given other frequencies such as 136khz, 500khz, 5Mhz and 70Mhz as other radio amateurs in other countries.

Lawrence  
9H1AV/9H9MHR

## **What is a Smith Chart**

Prior to the arrival of the electronic calculator, generations of engineers, through practical usage of their "slide rules", gained an inherent understanding of logarithms.

RF engineers have also a tool which assists in the understanding of transmission lines.

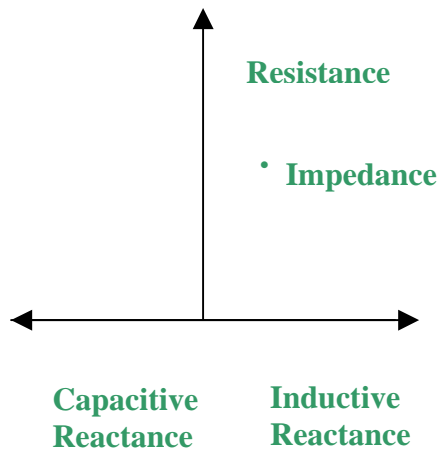
This is called the Smith Chart, after the mathematician P. Smith, who developed and published it originally in 1939.

Unfortunately, engineering schools always fail to teach students how to make practical use of Smith Charts (or even slide rules).

Now, with PCs readily available, there is less motivation to self-learn how to use these tools, which do provide an insight and simple means of handling the calculations involved in transmission lines and components at radio frequencies.

As hams, we have all learnt that an electronic component can be represented as an impedance which is a combination of (pure resistance) and (inductive or capacitive) reactance.

Any such complex impedance can be visualised as a point on the Argand Diagram.



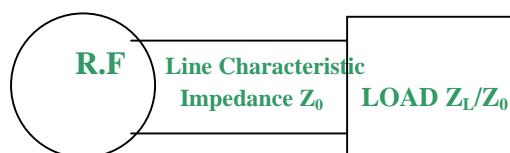
### Argand Diagram for representing Complex Impedance

Further, we have learnt that a RF transmission line has a characteristic impedance ( $Z_0$ ) dependent on its physical cross-sectional construction.

Now, if this line is terminated by a load impedance of the same value,  $Z_0$ , then all the power is transferred into the load.

Any other load impedance will cause some power to be reflected back (the proportion is defined as the reflection coefficient) resulting in standing waves along the line.

There are complex mathematical relationships between the reflection coefficient, the standing wave ratio (SWR) and the normalised load impedance  $Z_L/Z_0$ .



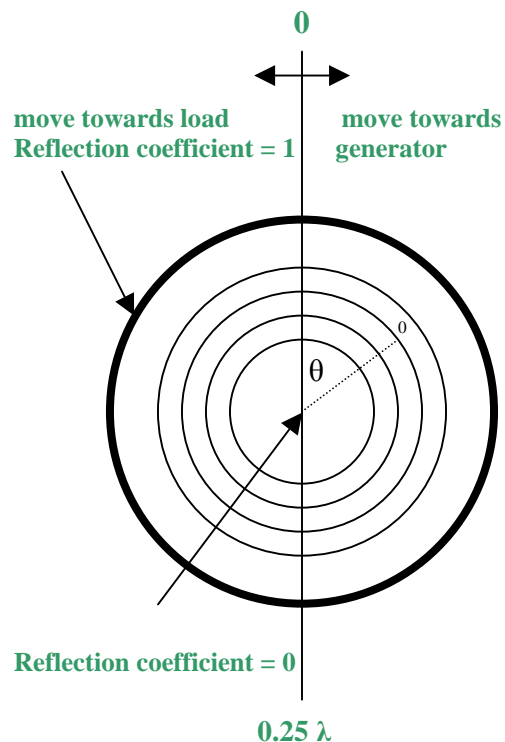
### Schematic of the transmission line model

It is well known that a specific reflection coefficient can be represented graphically as being on a circle of radius equal to magnitude of the reflection coefficient.

This reflection coefficient is defined as lying between the values 1 (total reflection) to 0 (no reflection).

The angular position, on a circle of constant reflection coefficient, represents the measured phase angle of the reflection, thereby defining the polar coordinates of the reflection.

At the measuring point, the phase is going to depend also on the electrical length of the line, so in shifting up and down the line, the measured value moves around the circle representing the reflection coefficient, rotating once every half-wavelength.



### Chart showing Reflection Coefficient

The Smith Chart is the chart above, used to represent the reflection coefficient, on

which is also traced the impedance values of resistance and reactance.

These traces are no longer the familiar  $x - y$  rectangular coordinates of the Argand diagram, but follow different circular paths on the reflection coefficient chart.

In practice, once the reflection coefficient (and its phase,  $\theta$ ) is known, it can be plotted on the Smith Chart and impedance immediately becomes available in the familiar terms of resistance and reactance.

To simplify the printed chart, it is usual to omit the concentric circles representing the reflection coefficients, since the user will place these himself (with a ruler and compass) as he performs the measurement.

This usually involves measuring the SWR, identifying a phase reference point (probably an open circuit, replacing the device under test) and the electrical length of the transmission line.

Once the concept has been grasped, the Smith chart becomes an essential tool in computing the complex impedance of combinations of components, both discrete and distributed.

Problems of matching loads, tuning antennas, optimizing bandwidths, and even simply handling complex number arithmetic can easily be handled.

For those who insist on using their PC, there is a very useful and educational programme for manipulating the Smith Chart, by Marian van Westen (PA0MVW), called PASAN.

You can download it free from <http://members.home.nl/mvanwesten/prog/pasanse.zip>

As with all techniques, you will only learn and realize its full potential by using it.

Try manipulating the Smith Chart in a few examples, I'm sure you will find the results obtained make it worth the effort.

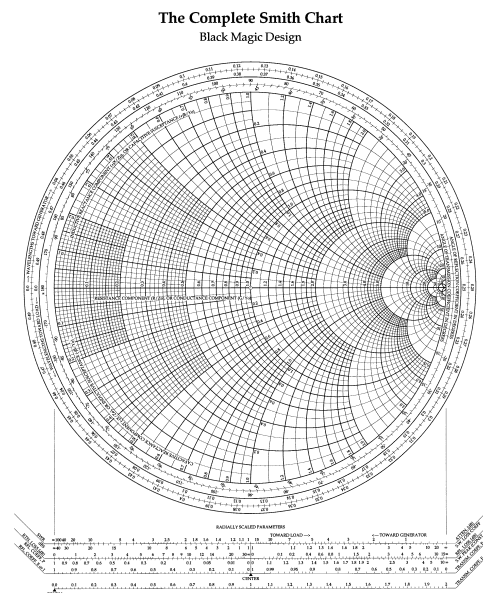
## The Complete Smith Chart

Black Magic Design

Due to practical restrictions, I had to reduce the size of the Smith Chart in the following example. However, you can download other copies from the link at the end of this Article.

You can also copy the chart and increase its size to A3 if you have an A3 printer. If not, increase its size to A4, print it and then increase its size through photocopying. (Lawrence)

Additional charts for printing can be downloaded (free) from, <http://www.engj.ulst.ac.uk/sidk/graph/smith.pdf>



Robin, 9H1ZZ

## Highway Robbery by Maltapost

Dear Editor,  
I am writing to complain and bring to the attention of the relevant authorities that Maltapost is practising what I call highway robbery on Maltese citizens.

In the international postal system, there are such things as International Reply Coupons, or IRCs for short.

These coupons are bought from post offices so that when someone sends a letter or a card to someone else and wants a reply, the recipient will not have to buy a stamp, but exchange the coupon for a stamp. All countries members of the Universal Postal Union are bound by this obligation.

In order to remove any doubt, there is written on the coupon words in this sense in different languages such as English, French, German, Spanish, Russian, Arabic and Japanese. The exact words in the English language are,

“This coupon is exchangeable in any country of the Universal Postal Union for the minimum postage for an unregistered priority item or an unregistered letter sent by air to a foreign country.”

Maltapost accepts these coupons, but only for a stamp value of 16 cents and wants the client to pay the difference. This is a clear breach by Maltapost of its international obligations and highway robbery of Maltese citizens and other clients.

To rub salt into the wound, Maltapost sells these IRCs for 50 cents and only gives you a 16-cent stamp.

I am therefore going to send an e-mail to the Universal Postal Union to inform them on what is happening at Maltapost so that they may take the necessary steps to force Maltapost to abide by its international obligations, and send an e-mail to the person who sent me a card from Japan to explain the situation in view of the arrogance and lack of observance of international obligations by Maltapost.

Lawrence Galea.

This letter appeared in the Times of Malta, but those administering Maltapost are so arrogant that they didn't even bother to answer it. Shame on them.

This letter is being published here as this magazine is published on the MARL website so that people all over the world will know about the shameful situation as regards IRC's sent to Maltese persons.

Lawrence  
9H1AV/9H9MHR

### **MARL Activities**

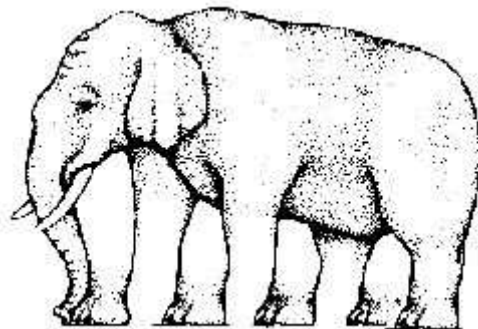
**On Saturday 6 and Sunday 7 May the Spring show will be held at San Anton Palace.**

**We were invited to have an amateur radio station operating from the show and are doing our best in the short time available.**

**Whoever is interested or is willing to help should come to the Club or contact a Committee member to see how we can organise this activity.**

**See You**

### **Can you work on small printed circuits?**



Carefully count the elephant's legs to see if your eyesight is good enough to be able to work on small printed circuits.

Picture from  
<http://www.humoronline.com>

**Happy Easter**

**The MARL Committee wishes our Members and their families as well as to whoever reads this magazine on the internet a Happy Easter.**