



# E-MAGAZINE HAM-MAG

The first free & monthly E-magazine for amateur-radio, SWL...



## 4U1VIC in WAE SSB contest 2008

### FT-290 SECOND LIFE



### ZAO DX'PEDITION



NUMBER 3  
FREE ISSUE

MARCH 2009  
<http://www.ham-mag.com>



# Number three !



Dear YL, dear OM,

Almost 8,000 readers of HAM-MAG.

More than 4,000 readers for this english version and 3,900 readers for the french one.

This is (may be) the begining of a great adventure. This magazine is living thanks to you, and only you (as Elvis used to sing).

For my job (yes, I have another job), I crossed the France a week ago and was surprised by one thing : antennas have disappeared from the roofs. Just 15 years ago I liked to look the Ham antennas, and nowadays there are more money in the pocket of a trader than antennas on the roofs.

We have also seen recently the bankrupt of the two ham magazines in France, the crisis is everywhere.

A web-magazine as Ham-mag (and others) is a good way to promote our activity and to save money and trees. So, don't hesitate to send me any informations about radio, homebrew, DX...

To communicate and to share informations is the way of the hamming folks

So... dear YL, dear OM, Carpe Diem for this number 3 !

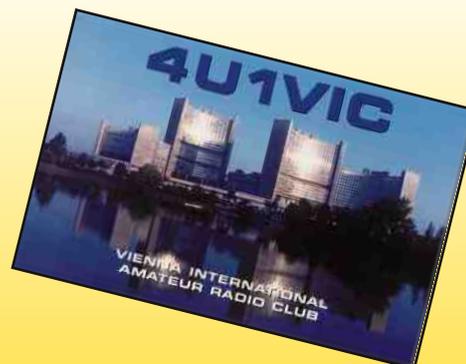
**Best regards and 73's**  
**Vincent FAUCHEUX - F5SLD**  
**HAM-MAG**



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# THE RACE WITH OBSTACLES

## By Francisc Grünberg, YO4PX

I started to read with great excitement the article written by YO2\*\*, dedicated to the 40 years anniversary of the radio club of Timisoara, my beloved place of birth, abandoned by me 37 years ago, but on whose streets I still walk often in my dreams. There I brought up and went to school, there I traveled in frosty winter mornings, when the mercury of the thermometer descended under -20 degrees C, sometimes on the foot board of the crowded streetcar 6, on its circular way, through the Maria plaza and on the bridge over the river Bega, trying to arrive in time to the Musical High School situated in the downtown. But I haven't imagined in my nastiest dreams that reading this article I will come across again with «comrade» Alexandru, albeit only under the spiritual shape of a name printed on paper. Like in a nightmare, comrade Alexandru reappeared in my life, though I was hoping once that I'll may erase him for good from my memory.

The author of the article is arrogating him good organizers' abilities - who knows, maybe he was really a good organizer - but for me he was the one who for two lengthy years prevented the fulfilment of a dream.

I was 16 when a class mate, a violoncelist inoculated me with the bug of amateur radio by giving me a few issues of the The Radio Amateur magazine and revealing me the «secret» that on the short wave bands, amidst the broadcasting stations one can hear radio amateurs ragchewing freely, something fast unconceivable to the spectators of the propaganda films of those years, in which the only ones operating radio stations were either brave Soviet soldiers, or spies, disgusting traitors in the service of the Western intelligence agencies, who ended always by being caught, thanks to the patriotism of a pionier or a Comsomolist (member of the Soviet Young Communists' organization), who discovered their activity and informed the authorities.

I found quickly in our rudimentary radio set the 40 and 20 meters bands and, amazed, I started to listen the QSO's of the local amateurs and of the foreign stations in AM, among them many Italian stations, with their extremely strong signals. Then, with the help of an old scout guide I learned by myself to copy the CW contacts too; obviously the signals didn't have a musical sound, they were only «buzzing», and I remember the thrill felt when I heard in a very early morning the trembling signal of a W6 station sending QTH CA and then a Chilean station from Antofagasta. I even manufactured log sheets, keeping record of my receptions and I started to dream that one day I will send QSL cards bearing my SWL call-sign!

In the winter of 1959 I entered my name for the telegraphy courses organized by the A.V.S.A.P., the «Voluntary Association for the Defence of the Homeland», held in the main room of the radio club and I graduated them in the summer of 1960. I became also the happy owner of a fabulous booklet with gray covers, the Radio Amateur Traffic, from which I learned a lot of new things. It comprised the list of the DXCC countries, their prefixes, their CQ zones. After a few months I knew most of them by heart, many of the prefixes appeared already in my «logs», so that when a member of the examinations commission for the amateur radio certificates asked me about some European prefixes I had no trouble at all to give him the right answers. In November 1960 I became the proud bearer of the Amateur Radio Short Wave Listener Certificate No.184 and I filed together with my telegraphy courses colleagues the application for the SWL License. Everything seemed to be all right, nothing foreboded the enter of comrade Alexandru in the scene and in my life, to overshadow the enjoyments of my young years.



I haven't seen him very often before, in the afternoons when the telegraphy courses were held I could admire only the skill of a few amateurs constructing in the room on the right side an enormous station, while in the room of the left side the legendary Mir, YO2CD was busy with his exotic CW QSOs. It was said that the new radio club chief is coming from the Army and that he has no idea about amateur radio whatsoever. Well, this haven't prevented him to reject my license application, while the other applicants - among them Hungarians and Germans besides Romanians, but

none of them Jewish - received their licenses and went off hastily to the workshop to order the stamps with their brand new SWL call signs. Alexandru was supported in his categorical verbal refusal - like in all other his actions - by a well-known ham from Timișoara, today an old-timer, who was shaking his head and shrugging enigmatically his shoulders alike the «boss», as an answer to my desperate questions.

This was the beginning of a tormenting time, marked by permanently renewed and afterwards unfulfilled expectations. Alexandru hoodwinked me, appointing time and again new dates when I had to present myself to the club, and I remember the winding staircase mounted by me with pang and hope and descended soon full of sorrow, having in mind a new date when - who knows, maybe, possibly, nevertheless - a mysterious and unseen guardian of the Law, arised out of the writings of Kafka, will finally take pity and will agree with the supplication of the poor unlicensed short wave listener, who desired so much to be within the Law.....

I have kept record of these visits to the radio club. They were as much as 35. At the thirty-fifth visit Alexandru, probably bored of the monotony of this repeated scenario, opened with soldierly courage a new battlefield: one has to be member of the UTC (the Union of the Communist Youth) to become a licensed short wave listener. The homeland has confidence only in UTC members. I objected: among my course colleagues who obtained the license I know a few who are not UTC members, some of them didn't even reached the necessary age to become UTC members. Alexandru sank for a while into his thoughts, but at last he found the saviour solution. A letter of reference from the school, that's it, I need to obtain a letter of reference from the school, but for this we'll go together, comrade Alexandru and me, to request the letter of reference from the headmaster. As a disciplined military man, he was waiting for me at the entrance of the high school on the appointed day and time, wearing his greenish uniform; in front of the headmaster's office he told me to stand by and he stepped in alone.

The headmaster was very fond of me, I was always included in his «troupe» of student-artists, able to perform a complete musical programme, sent by him to take part in all the artistic festivals held in the county, and with my xylophone, accompanied by a colleague at accordion, I scored fulminant successes.



I'll never find out what exactly they discussed inside the cabinet, the fact is that after a time Alexandru came out and showed in direction of the door: the headmaster is waiting for me. This entire suspicious theatre seemed to be of very ill omen. With burning face and stammering of emotion I presented to the headmaster my grievance to be issued with a letter of reference. As long I live I'll never forget the profound embarrassment of the poor man, constrained to deny my request, without being able to offer me any explanation at all. I left astounded the cabinet. Alexandru disappeared.

And with this all my hopes collapsed. I decided to give up irrevocably to this hobby, which for me seemed to be forbidden. But before that I've done however something: for the first time in my life I exercised my right of petition, granted by the Constitution, in my capacity of young citizen of the Romanian People's Republic. I wrote a long letter to YO3\*\*. I heard him Sundays transmitting on 40 meters band the official QTC's of the Romanian Amateur Radio Federation, and I thought that somebody must nevertheless learn about the mockery I've been inflicted, it must remain somewhere a trace of it. I counted him day by day the 35+1 summons to the club and I asked for his help, simply unable to understand why I have been refused to get something obtained by others without any difficulty. I sent one copy of the letter to the Central Radio Club, another one to his personal address, I found both addresses in the telephone directory. A few months I still watched the arrival of the postman. In vain. The Romanian citizens' right of petition was laid down all right by the Constitution, but not so the obligation of the institutions or the officials to give them an answer. Probably that's why the addressee did not condescend to reply to my S.O.S.....

After a year or so I came across on the street with a course colleague. He received already his transmitting license, he told me that he worked ZS4 on 40 meters. And he gave me another information: comrade Alexandru was called back to active service, the new chief of the radio club is Costi Dumitrescu, YO2BI. Go to the club, he's a good guy, maybe he'll give you a hand, added the colleague before we gone apart.

I ascended with trembling feet the well-known wooden stairs. And indeed: in the room tapestried in blue by comrade Alexandru, near the station sate a nice looking young man. I narrated him in short what I have been through and I showed him my SWL certificate. He smiled sadly, sympathetically, then he rose to his feet, extracted from a locker a form, he filled it in with my name and with the «receptionable bands» in my poor radio set: 7 and 14 MHz. Then he consulted a register and he filled in also the «call sign» column: YO2-1117. Go to the Central Post Office and ask them to stamp it, he said. Then he turned to another ham present in the room: Unbelievable, isn't it?

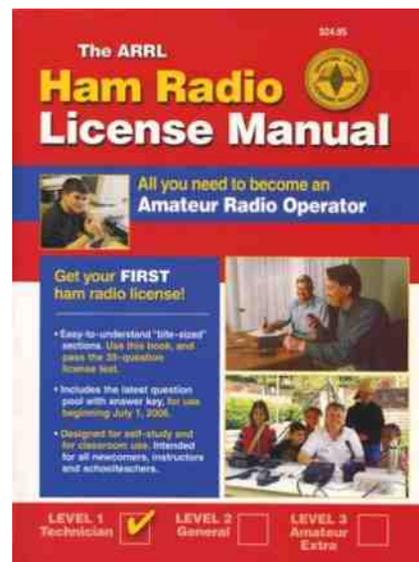
After a month I was there again, this time with about 300 QSL cards, my very first receptions as a licensed SWL. I brought with me the log copy as well - probably the younger colleagues doesn't know that in those years one had to present carbon copies, even for receptions, in order to be verified by the «authorities». Costi run over the pages and he said: Well-well, how nice would be if the transmitters could keep their logs as orderly as this one!

With this a chapter came to an end for me, but not so the ordeal of my race with obstacles. I reached its finish only in 1980, after 17 years of form-fillings, applications, petitions, remonstrances, memorials ... and receptions. I obtained my transmitting license at the age when other hams accumulated some 20 years of activity.

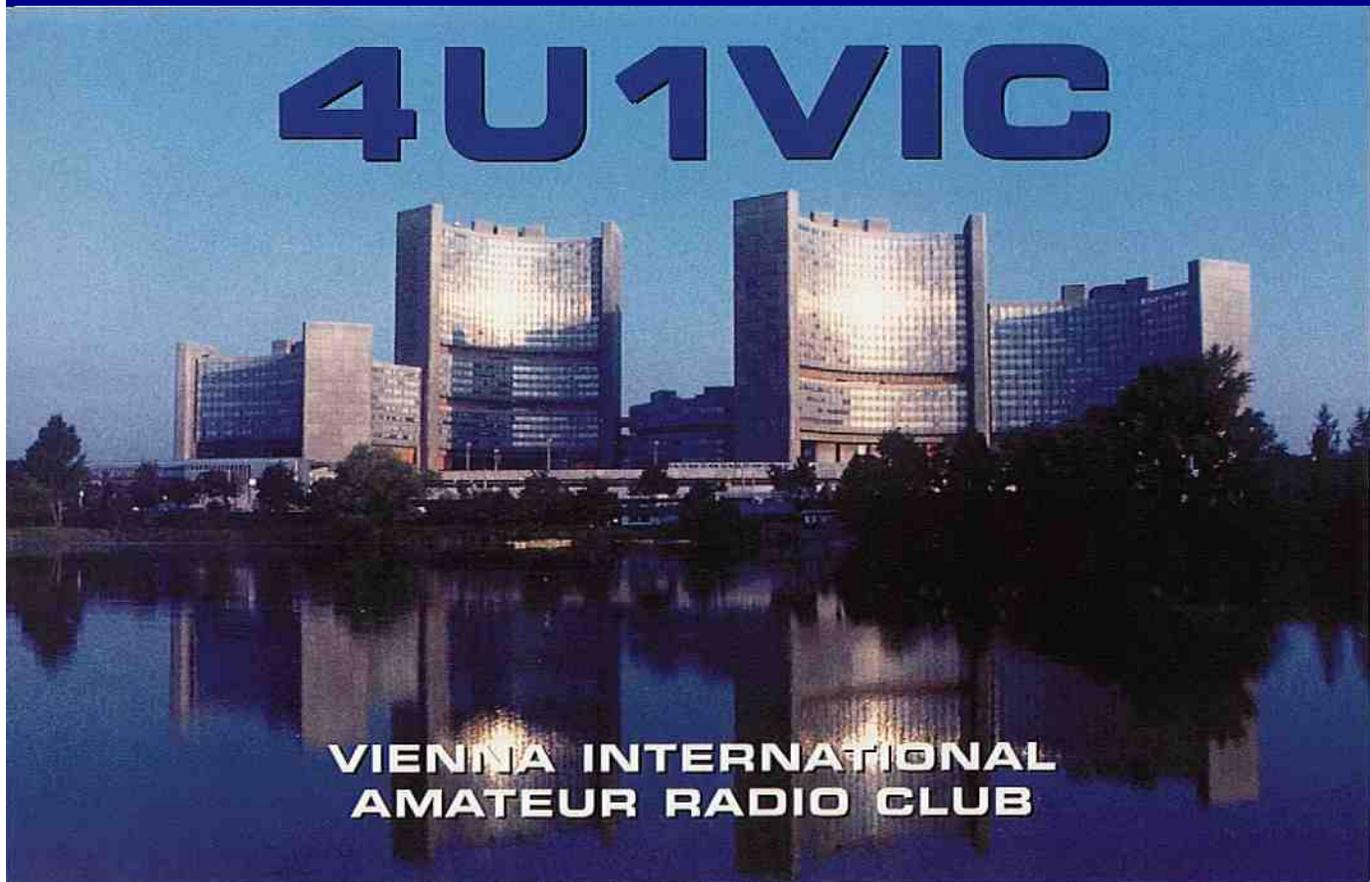
This is the way I've acquainted comrade Alexandru. I hope with my whole heart that on the way of their evolution our younger colleagues won't come upon such characters, who were able to do much harm to the Romanian amateurs, in those years plagued by arbitrariness and totalitarianism.

This text was published in the Romanian magazine Radiocommunications and Amateur Radio and on the independent website [www.radioamator.ro](http://www.radioamator.ro)

73's ! YO4PX



## 4U1VIC in WAE-SSB contest 2008 BY OE3SGU - Hannes



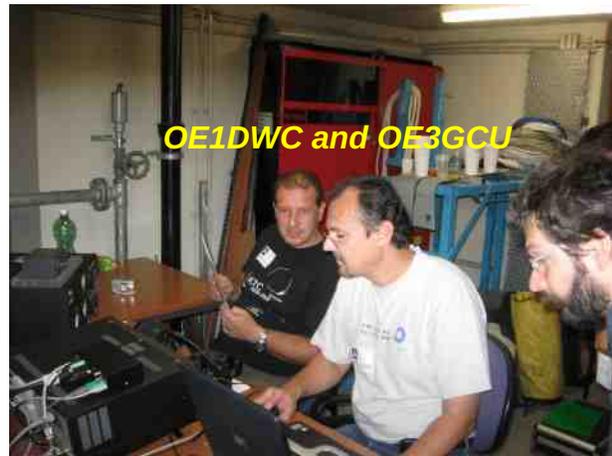
Every 2nd weekend in September the SSB part of the „Worked all Europe“ contest takes place ([www.waedc.de](http://www.waedc.de)). Normally stations located in Europe may only work stations located on another continent, but this year because of the 60th anniversary of the WAE diploma an exception was made: Europeans could also work other Europeans. Of course, no contest points were granted for these contacts, but the fun taking part in the competition was greatly improved.

This fact was enough reason for some hardcore shortwave enthusiasts (Günther, OE3GCU, Werner, OE1DWC and Hannes, OE3SGU) to think about participating from the UN Headquarters in Vienna, the Vienna International Centre (VIC). 4U1VIC counts as a separate region and multiplier in this contest and thus we expected some nice pile-ups. It also has been a while, since a multi-operator group has operated from the VIC. We soon thought about how to best realise this project.

After we established contact with some Hams from the VIC, ten days before the event all of us met and discussed the details, and we had a look at some possible contest locations. We wanted to plan everything as thoroughly as possible in the short time remaining – making the best out of the given facts and options.

Soon we realised, that participating during the whole 48 hours of the contest would not be possible. Security standards in the VIC require, that a UN staff member be with visitors during the period of operation. Furthermore, access to the VIC during the weekends is only possible in a very restricted manner and requires an early registration. Thankfully, Rom, OE1RKS, Alex, OE1AWB, Bernhard, OE3BLB and Rainer, DL1DTN – all employees at the VIC – offered to stay with us during our contest activity. Needless to say that this is not a matter of course as normally all rather like to spend their weekends with their families instead of at their QRL's location.

A short visit and inspection of the present shack of 4U1VIC in the G-building near the "Austria Center" conference-building soon showed us that there is relatively little space for wire antennas. Even installing a beam would not be an easy task. Also, the G-tower "only" has 48 meters of height and transmission into some direction is severely blocked by some of the higher UN-buildings around. Among other offices, the G-building accommodates UNIDO and IAEA. On the other side, building "D", seat of UNIDO and CTBTO, is a massive 102 meters tall and offers a relatively free sight into all directions. According to Alex, OE1AWB, a temporary weekend-operation from the D-tower would be possible. He could offer us a little room on top of the roof that is normally used as a service-room for elevators. The room offered just enough space for the group and sheltered us from any outside noise, wind and rain.



Friday before the contest the antennas had to be installed. We used a Cushcraft A3S tribander (lent by Georg, OE1GPC) including a SPID-rotator (from Manfred, OE1MB) for the higher bands. For 40 and 80 meters we had monoband dipoles which were adjusted by Günther, OE3GCU, for a perfect low SWR. Installing the antennas was more difficult as we expected and took until sunset.

A total length of 130 meters of coaxial cable was needed. Günther and Werner really had planned every little detail. There was literally nothing they had not thought about. Every adapter and tape, every screw, an SWR-analyzer, ropes – all had been brought by them. For enabling us to install the A3S at the ladder on top of the roof some special brackets had to be built.

The exposed – and sometimes very windy – location on top of the D-building offered a phantastic view all over Vienna and to parts of OK and OM. This location was a dream for someone whose options in installing outside antennas are very restricted or non-existent.

The radio in use was Günthers's Icom IC-775DSP, including a Heil-headset, a foot-switch and a microHam micro-keyer. Werner brought along his OM-Power 2500 linear amplifier. With a modest drive of 20 watts this linear delivers a massive Kilowatt output – just what we needed for the rough contest-use. All the logging was done by „Win-Test“.

We were on the air for a total time of approximately 20 hours. On Saturday we worked from 0755 to 2245 and on Sunday from 0710 to 1655 (local time). Late in the afternoon on Sunday we started disassembling the antennas and evacuating the equipment. Only a very modest operation during the nighttime was planned. We worked in shifts of 2 hours which proved of value as it gave everyone some time for other obligations.

Unfortunately, band conditions during this weekend were absolutely disappointing.

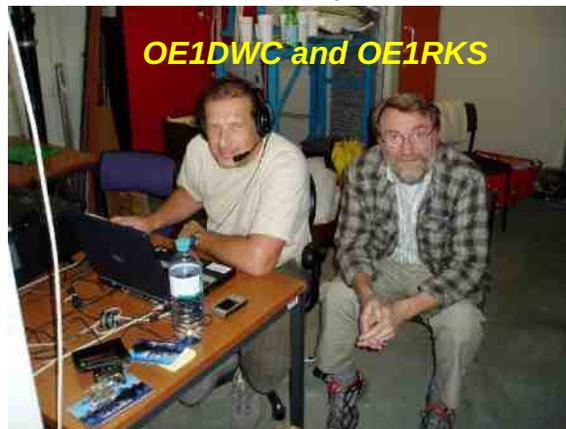
In the morning we only had smaller pile-ups, mainly with European stations on 40 meters. During these times of low activity we mainly “searched and pounced” the bands for new multipliers. Probably only a few European stations knew that this year they could also work other Europeans. Most of the callers came from outside our continent.

In the afternoon, 20 and 15 meters often provided wide openings and we finally could change into “running”. Especially on 20 meters we had nice pile-ups to North-America and to Japan. Many W6/7’s, VE’s and JA’s/HL’s had big signals over S9 and queued to work us. Interesting entries into our log on 20 meters were stations from 5R, 9K, 9M2/6, BY, EY, HI, HK, TI, TR, TU, UK, VU, YB, YI.

15 meters partly showed nice signals from Near, Middle and the Far East, but most openings only were of a short duration. Among others, we were able to work stations from A7, HS, HZ, JA, UA0, UN, YB. 40 meters opened to South America; the prefixes HI, HK, PY, YV could be logged. But we also managed to work 4L, 5B, EA8, EA9, JA, TA, UA0, VK und some W’s on this band.



All QSO’s of this activity – as it is a tradition with 4U1VIC – will be automatically confirmed via



the bureau. Of course all direct cards will be answered, too. We will also upload our log into the ARRL’s Logbook of the World (NOTE: ONLY contacts for this activity! All other, earlier QSO’s of 4U1VIC are not available in electronic form!)

A special thanks to all of the UN-staff who supported and accompanied us patiently during this contest. Thanks to Rom, OE1RKS, Alex, OE1AWB, Bernhard, OE3BLB and Rainer, DL1DTN – without you it would have been impossible to realise this

project!

Our thanks goes also to the very patient security staff, who assisted us in checking in and –out the pile of boxes and antennas and tolerated our presence during the weekend. Last but not least: thanks to our partners who gave us a free weekend for our hobby and to everyone who called us.

We are looking forward to the next QSO in the next contest or during the next activity of 4U1VIC!

### QSO-statistics for 4U1VIC 13/14.9.2008:

A total of 1027 QSO's with 80 DXCC-entities were made,  
on

80 m:	3	0,3%
40 m:	238	23,2%
20 m:	763	74,3%
15 m:	23	2,2%
10 m:	0	

by continents:

Africa:	16	1,6%
Asia:	135	13,1%
Europe:	399	38,8%
North America:	453	44,1%
Oceania:	5	0,5%
South America:	19	1,8%

claimed score: 173756

© Hannes Grünsteidl, OE3SGU (oe3sgu@gmx.net)



# A NEW LIFE FOR THE FT-290R TRANSCEIVER !

## By F5RCT

The FT-290R is an old amateur radio workhorse which was a very popular transceiver during the 80's. It is a 2-metre multimode portable which can run with or without an external 12 V power supply unit. Still quite favoured as an exciter for transverters or linear amplifiers, it is built like the proverbial brick outhouse. Large numbers were sold and they are now commonly available for around 150€. They seem to be reliable in general and most components are discreet and can be replaced. The following article proposes a list of modifications "à la carte" to improve their performance.



The Yaesu FT-290R is a multi-purpose, multi-mode FM / CW / USB / LSB portable 2-metre transceiver. With 13.8 VDC input, output power is 2.5 watts. Coverage is 144 to 146 MHz. FM steps are 12.5 or 25 kHz for the European version. CW/SSB steps are 100 or 1000 Hz. It has a built-in telescopic antenna. The radio operates from eight alkaline/NiCad C cells (not supplied) or from an 8.5 to 15.2 VDC power supply. It measures 6 x 2.5 x 7.9 inches (150x58x195mm) and weighs 1.3 kg.

For modifications you need the schematic diagram and the alignment procedure described in the user manual [1]. The minimum equipment required to align the transceiver is a power metre and a frequency counter (or better: a spectrum analyzer).

I have tested four devices: on some of them PLL and SSB modulator frequency crystals drifted due to ageing. Aluminium capacitors had aged too and showed an equivalent series resistance of more than 3 Ohms on 10µF capacitors. Some of them can leak, block the AGC line and have an effect of "heating up" when power is turned on.

### ***Internal antenna removal and Pi filter improvement:***

The FT-290R has a reputation of low sensitivity when the transceivers from the 90s came on the market. Mutek Ltd offer the SLNA290s [2] preamplifier but the internal antenna system will bring losses anyway.

This present modification has two advantages:

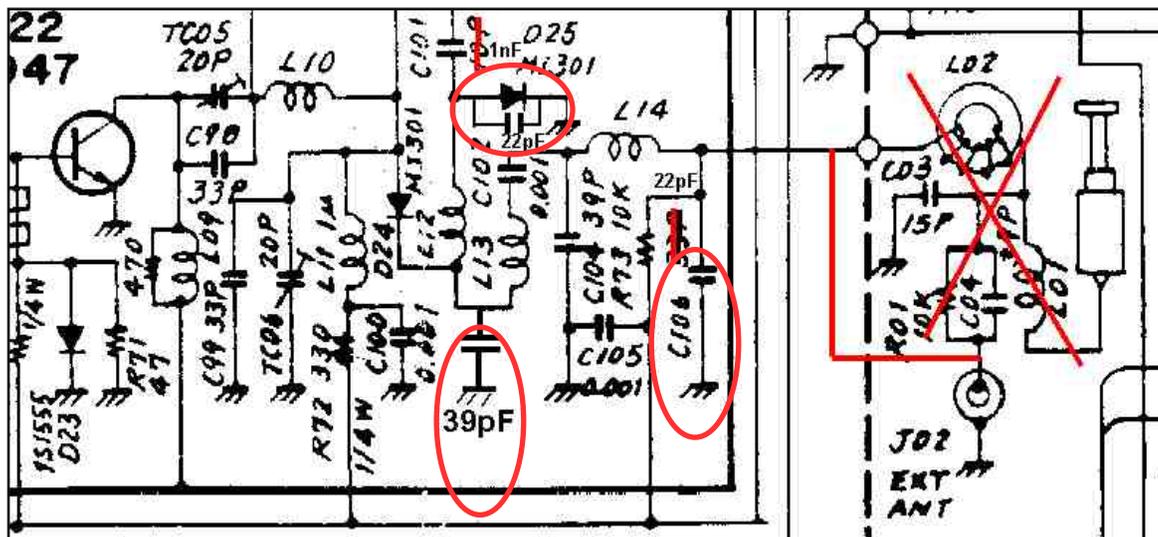
- It reduces the loss on the system by 2dB, improves the output power (x1.5) and sensitivity is better.
- For OMs who don't like the antenna socket connection at the back, it is possible to replace the antenna by a BNC socket on the front panel. Removing the inserted ring can be done by drilling it carefully through with a 10.5 mm diameter tool. On one device, I used the hole to place a 3.5mm stereo phone socket. Very useful for common headsets!

The output Pi filter shows losses and needs to be modified.

Remove the antenna and the tube along the flange and the components wired to the main board.

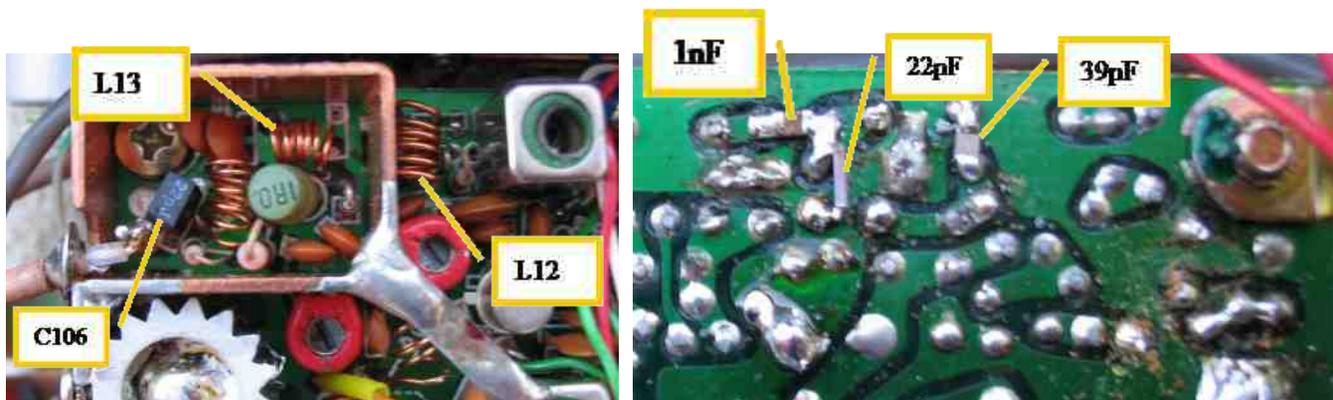
Remove all external components located outside the main PCB : From small toroid L02 to L01.





It is possible to replace the capacitors with 1206 or 0805 SMD 50V COG soldered directly on the bottom of the board. : it's easier and quicker than removing solder from holes.

- Now replace C106 (33pF) to 22 pF with a good ceramic capacitor (located in the corner near the screw).
- Replace L12 with 6 turns on 3 mm diameter using 0.5mm enamelled wire.
- Add a 39 pF capacitor between L12 and L13 (a location is foreseen).
- Add a 22 pF capacitor parallel to D25.
- Replace C101 with a 470pF to 1 nF capacitor.
- Reassemble the turns of L13 as shown on picture.



The Tx output stage needs to be tuned. Select the high power switch position. Adjust VR2003 to maximum power, and then adjust TC05 and TC06 to maximum power at 145 MHz in FM mode. The current is approximately 1.1A at 12.5V and maximum power is 4.5 W on my sample. Then reduce the power to 3.5 W by adjusting VR2003 again. This is necessary to stay linear in SSB mode. Select low power switch position, and then adjust VR2006 to 500 mW. The insertion loss on Rx is improved from 2.7 dB to 0.7 dB. On Tx the loss is improved too: from 2.5dB to 0.6dB and allows more than 1W in additional power.).

Using the FT-290 as a transverter or a PA:

The FT-290R has two power levels: 2.5W and 500 mW.

The low power mode may only be used for power consumption reduction. In low power mode ALC is not working and modulation compression is not present. The low level depends on a gate voltage of the Tx IF chain, this will imply large tolerance on this level, depending on temperature and frequency.

To use the transceiver with a PA or a transverter I recommend using it in 2.5 W mode. It is possible to adjust the level with VR2003 down to 1 W.

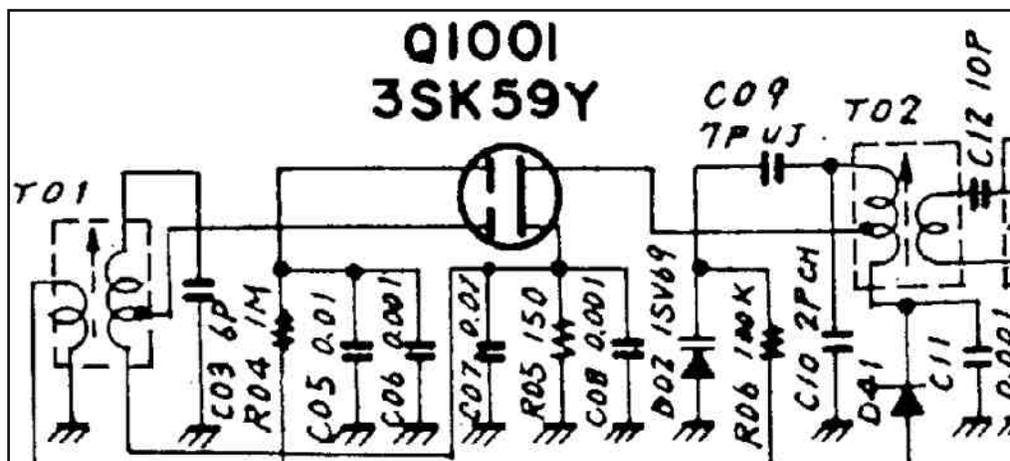
**Receiver sensitivity improvement :**

Sensitivity of initial circuit with modifications of Pi input filter and internal antenna system removed. Connection direct to S0239 antenna socket:

- 120 dBm measured (0.22  $\mu$ V) at squelch threshold in FM with CW signal.
- 115 dBm measured (0.39  $\mu$ V) for 20 dB (S+N)/N in SSB with CW signal. (0.5  $\mu$ V specified on datasheet).

The poor sensitivity comes from different design reasons and from the input transistor:

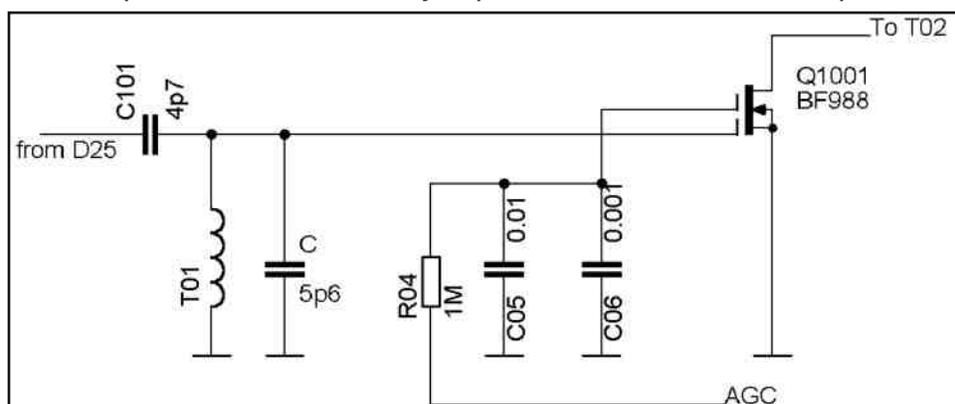
- Antenna switching from antenna socket to receiver input has high loss. The last modification reduces the loss by 2dB.
- The input transformer T01 has loss too. Having a transformer with very thin winding wire introduces loss compared to a direct matching circuit.
- The input transistor Q1001 has a poor noise figure even if the gain is sufficient. A quick modification consists in grounding the source resistor to increase gain (+1 or 2 dB) and drain current: but there is no improvement in sensitivity (signal to noise). This will increase G2 voltage and gain. This transistor is located close to the power jack.

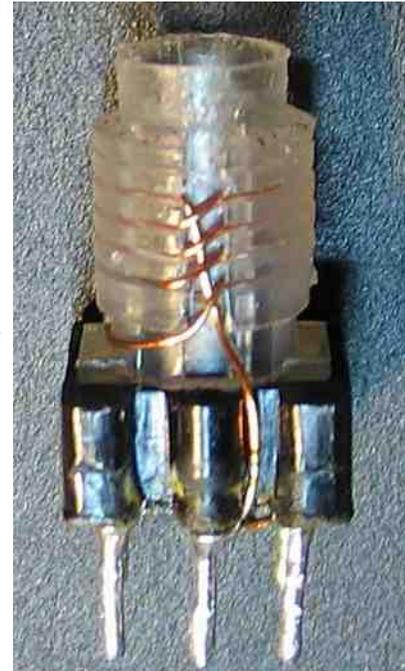
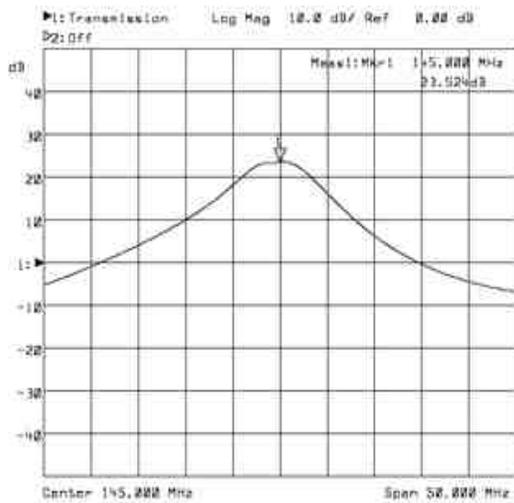
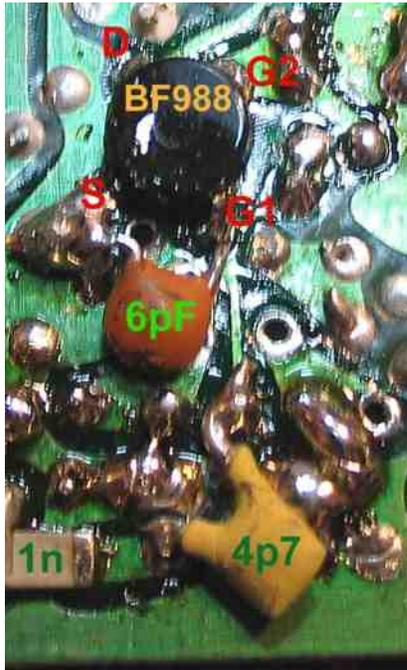


De-soldering of T01 is easy by using a large tip and adding a lot of solder tin to heat all leads together. Remove Q1001, C03, and C07. Clean holes with a de-soldering pump.

Replace Q1001 with a BF988 soldered on back side with reference facing the PCB. It is possible to use a BF690, BF961 or BF964 (or the SMD versions: BF998, BF994, ..)

Remove carefully the shield from T01 and the ferrite cap, cut the wire and clean the coil support. Then T01 is wound with 4.5 turns of 0.25 mm enamelled wire. Start the winding at the top second slot from G1 pin connection to finish at ground connection. Place the 6pF or 5.6pF capacitor from ground S to G1. Add a 4.7 pF capacitor from G1 to input close to C101, or replace C101 with 4.7 pF and make a short jump to G1. Solder non used pins of T01 to ground.





The front end stage T01 and T02 need alignment at 145 MHz using an RF signal generator, based on maximum deviation of Smeter.

#### **Tests:**

Sweeping the stage from antenna input to output of T02 gives a gain of 23.5 dB. The AGC voltage of 2.1V is sufficient to get the maximum gain.

-123 dBm measured (0.16  $\mu$ V) at squelch threshold in FM with CW signal.

-118.6 dBm measured (0.263  $\mu$ V) for 20 dB (S+N)/N in SSB with CW signal. With -128.6 dBm measured (0.083  $\mu$ V) for 10 dB (S+N)/N it is possible to decode a good CW signal.

The sensitivity measurement shows a 2.6 dB improvement, with the modification of the Pi filter it is about 5 dB better!

Calculating the approximate noise figure from output S/N to input S/N:

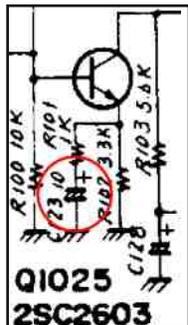
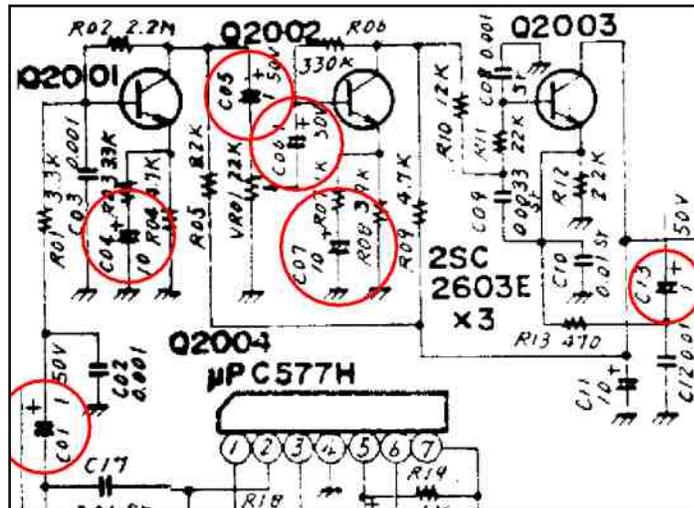
$$NF = (-128.6 \text{ dBm}) - (-174 \text{ dBm/Hz} + 10\log(2400 \text{ Hz}) + 10 \text{ dB} [(S+N)/N]) = 1.6 \text{ dB (Not bad!)}$$

#### **Modulation improvement :**

If you have a low pitched voice and reduce plops effects it is necessary to cut off audio low frequencies by changing some capacitors. This modification improves the quality of modulation by cutting low frequencies under 300 Hz. A slight emphasis of 3dB is introduced from 300 to 1000 Hz to make the voice clearer.

The original SSB microphone preamplifier has a low frequency cut-off near 10 Hz. This will not improve the rejection of residual side band under 300 Hz and produces a scratchy modulation.

Located on board near VR2001, change the C01, C04, C05, C06, C13 capacitors for 100nF X7R ceramic capacitors. See capacitors marked in red circles on picture below. The C07 capacitor is replaced by a 1 $\mu$ F aluminium.



**Audio quality of reception :**

On earlier versions of FT-290R the audio gain is too high and the volume control range is too straight.

The change had been made by Yeasu during production. Check if capacitor C123 and resistor R101 on the board are mounted, if it is the case remove them. See location marked with a blue circle on picture below.



**Battery replacement :**

Check the voltage of the battery: If measured voltage is less than 2.8V the battery is at the end of its life.

It is difficult to find a lead type battery the same as the original. On old computer motherboards you can find a good CR2032 battery holder. Just drill a hole on the PCB ground plane and place the holder to solder it. Before placing a new battery check the small 10µF capacitor on the CPU board (located near the CPU chip): if oxidation is visible, clean the PCB and replace the capacitor with a 100nF or 1µF ceramic if possible for less leakage current.



### **S- meter and LCD panel lamp replacement :**

The main weak point of the FT-290 is the small incandescent backlight that has to be replaced periodically. This lamp does not handle a voltage greater than 12.5 V and blows at 14 V. It is a real pain in the neck if you do your own repairs: do the replacement once and for all.

It is possible to replace the light bulb by two white LEDs side by side in series with a 470 Ohms resistor.

This modification depends on surface mounted LEDs picked up from mobile phones. The procedure is lengthy due to the removal of the front panel and the stack of printed circuits.



### **Reverse polarity protection :**

The protection against reverse polarity of supply is not sufficient: F5AEG burned the CPU board of his device. By studying the schematic diagram and the device structure we spot a diode (D01 10D1) located on the power jack and PL socket that will shortcut the supply if reverse polarity is applied. This diode is a silicon junction (0.7V) diode and is too weak for strong power. A fuse follows the switch and the diode to protect the device against inside shortcircuits.

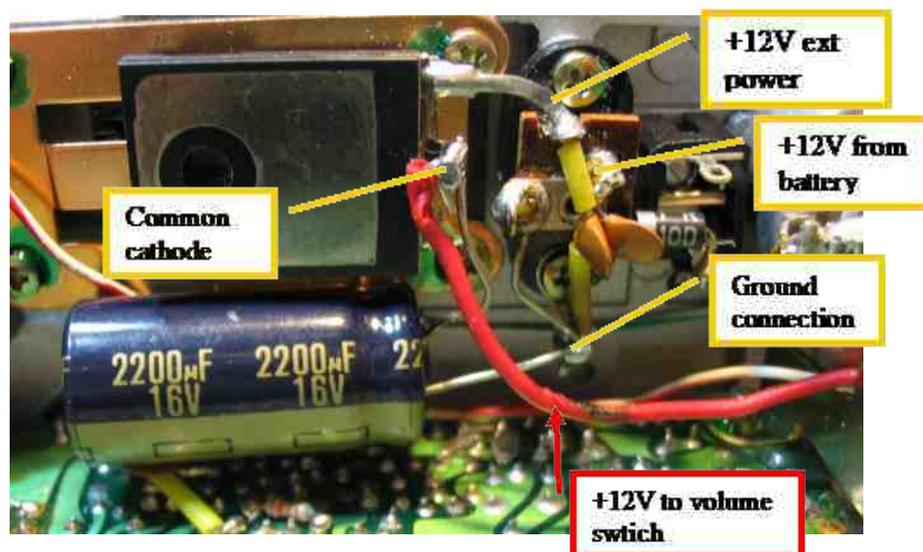
The recommended improvement is to remove the input diode and add a Schottky series diode on +12V of the device. This change adds a voltage drop of 0.3 V max but protects the device absolutely without any trouble. The Schottky diode may be found in a computer power supply, it is the +5V rectifier diode, generally a double 30 A to 60 A 45 V diode.

Remove the parallel diode on power jack and PL socket.

Connect the two anodes of the Schottky diode together. Then solder the anode to the power jack and the cathode to the red wire and +V pole of the capacitor.

Check the capacitor and replace it if necessary with a 1000  $\mu$ F 16 V minimum. This capacitor protects the device against voltage spikes present on vehicles.

Another idea is to connect the Schottky diode in parallel to the supply after the fuse. In this case the fuse will blow if reverse polarity is applied. If you do this the anode ground connection must be connected to the frame near the fuse on the power supply board. Bear in mind that if the ground impedance is too high the protection will be not sufficient.



**PLL phase noise and spurious.**

The signal at Rx mixer gate 2 was measured with an R&S FUP spectrum analyzer and phase noise system measurement.

Phase noise:

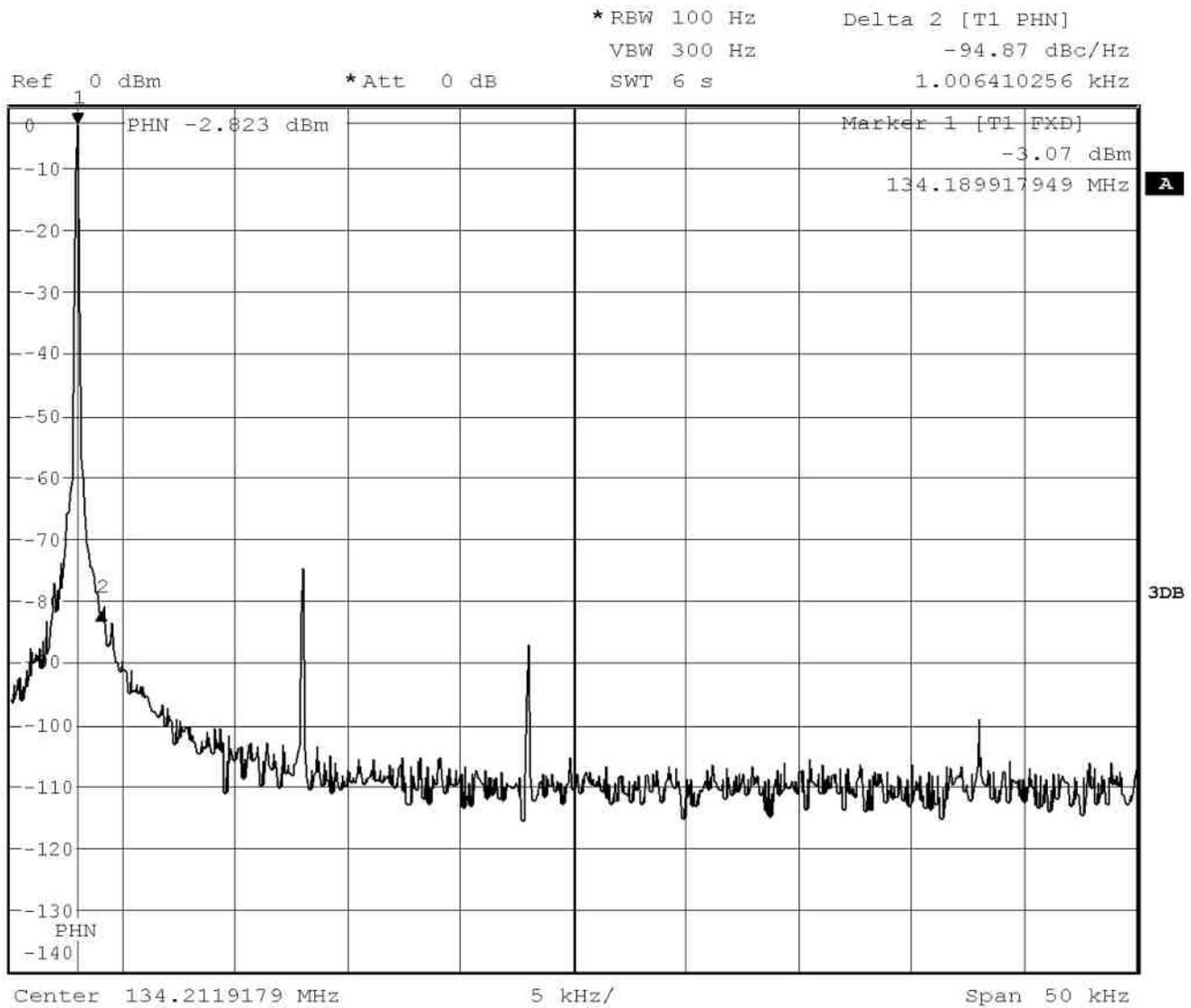
- 95 dBc/Hz at 1 kHz offset
- 111 dBc/Hz at 3 kHz offset
- 122 dBc/Hz at 10 kHz offset

Spurious:

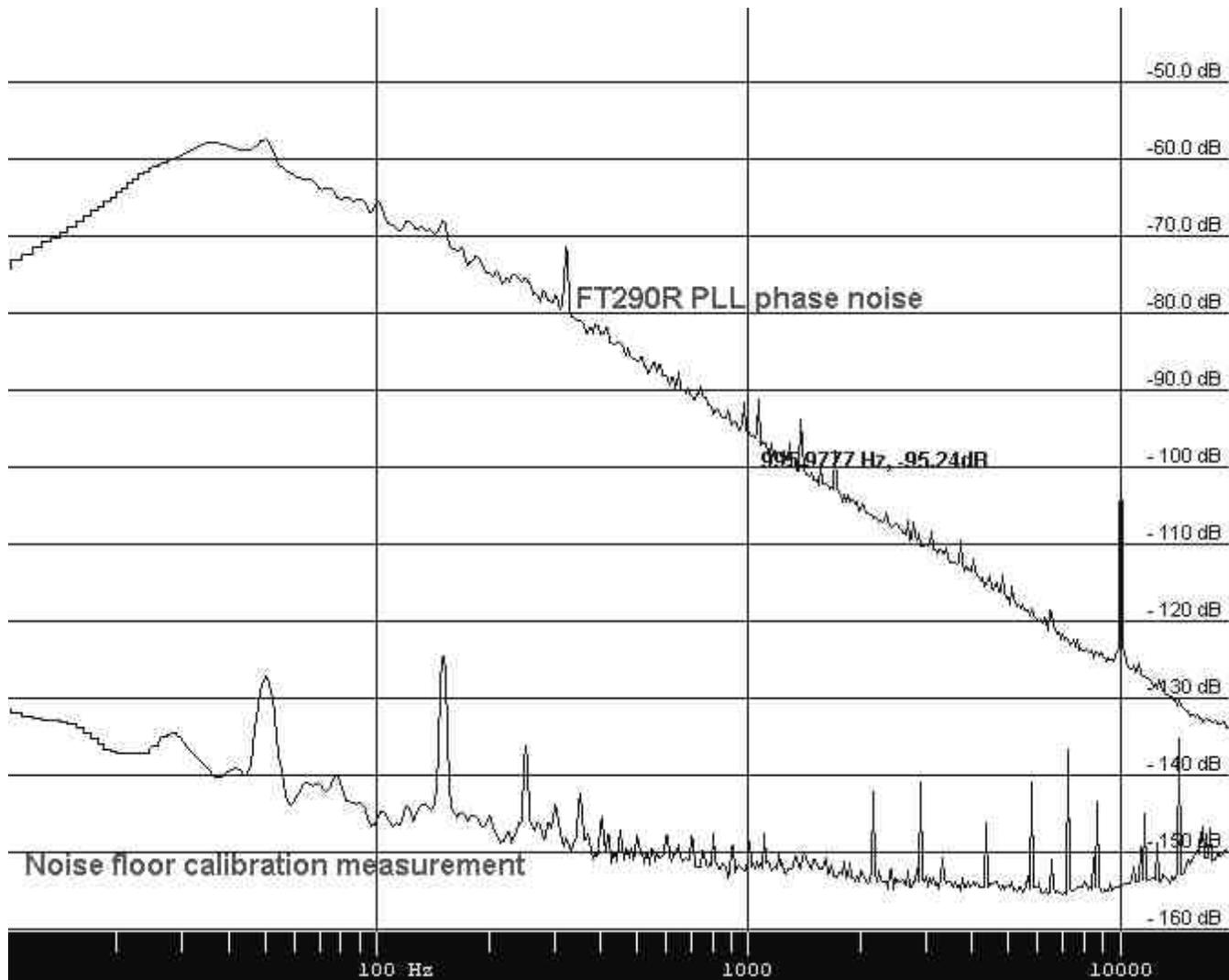
some residuals from the comparison frequency of the PLL

- 70 dBc at 10 kHz offset
- 80 dBc at 20 kHz offset
- 95 dBc at 40 kHz offset

Spectrum measurement:



PLL phase noise measurement: -95 dBc/Hz at 1 kHz offset



***It is possible to reduce PLL noise:***

- Limit the frequency range to 144-145 MHz with the jumper configuration on the CPU board. Then adjust the TC01 trimmer capacitor of the PLL's VCO (see alignment procedure) at 3.5 V for 145 MHz. The RF filters on receiving (T1001-T1004) and transmitting (T2001-T2006) section need tuning too.
- Remove the PLL shield and cut the track from pin 8 of PLL circuit to resistor R27 (1k), then add SMD 4k7 to 10k resistor. This modification decreases the noise on tuning voltage.
- On earlier versions the -6.8V voltage is provided by ICL7660 (8 pins DIL IC). Noise is generated on +5.6V, audible in FM mode. It is very easy to improve by connecting a 10µF capacitor between pin 8 and ground.

More information and modifications can be found on the web [3]. I hope these will help you!

73 de F5RCT Jean-Mathieu STRICKER      f5rct.jm<at>gmail.com

***References:***

- [1] : <http://www.mods.dk/>
- [2] : <http://www.mutekrf.com/index.html>
- [3] : <http://www.whelan.me.uk/radio/mods290i.htm>

# THE DX NEWS

## From the Web (tnx opdx, 425 dx news, arrl...)

### **2M, SCOTLAND** (Satellite Op)

Paul, 2E1EUB, will once again be active as 2M1EUB from March 21st for one week. He will sign 2M1EUB and be active on all the satellites from northeast Scotland. Also, look for him on 160 and 80 meters. Checkout QRZ.com under 2M1EUB for more info.

### **5N, NIGERIA** (EME and Possible IOTA Op)

Bodo, DL3OCH, will be working from here between March 5th and July 24th. Activity will be on all HF bands (160-10 meters) plus some operations on EME. His expected callsign will probably be 5N/KT3Q. There is mention that he may also activate the Bayelsa/Rivers/Akwa Ibom etc States IOTA Group (AF-076). QSL via DL3OCH.

### **9M8, EAST MALAYIA**

Steve, 9M6DXX, will operate as 9M8Z from Sarawak (OC-088), March 26-29th. Activity will include the CQ WPX SSB Contest (March 28-29th) as a Single-Operator/Unassisted/All-Band/High-Power entry. Outside the contest look for him to be on 40 meters SSB using a 3 element Yagi. QSL via M0URX, direct, by the Bureau or LoTW.

PLEASE NOTE: QSL Manager Tim, M0URX, states, "This week 180 QSL cards have been posted by air mail from recent activities. Logs have also been uploaded to LoTW."

### **AH0, MARIANA ISLANDS**

Operators Kuniyoshi/7L1FPU (W1FPU), Yoshiki/KH0UA and Satoshi/N2QP will be active as AH0BT during the CQWW WPX SSB Contest (March 28-29th). QSL via 7L1FPU.

### **CN, MOROCCO**

Hartwig, DL7BC, will be active as CN2BC during the CQ WW WPX SSB Contest (March 28-29th) as a Single-Op/All-Band/Low-Power entry. QSL via DL7BC.

### **EI, NORTHERN IRELAND (30m Digital)**

Daithi, GI7OMY, informs that EI stations will be permitted to commence operating on Digital modes on 30 meters starting March 29th. He plans to activate the club callsign M10EPC for European Phase Shift Keying Club (EPC) on that day on 10140 kHz. QSL via GI7OMY.

### **FP, ST. PIERRE AND MIQUELON**

Eric, KV1J, will once again be active as FP/KV1J from Miquelon (NA-032) between March 4-9th. Activity will be on 80-6 meters using CW, SSB, RTTY and PSK31. He will also be in the ARRL DX SSB Contest (March 7-8th, 2009). QSL via his home callsign, direct or by the Bureau. Also, LoTW or eQSL. Visit his Web page at: <http://www.kv1j.com/fp/March09.html>

### **GJ, JERSEY (EU-013)**

Dez, G0DEZ, will be active as GJ3WW during the CQWW WPX CW Contest (May 30-31st) as a Single-Op/Low-Power entry. This will be a holiday style operation. QSL via LoTW or direct to G0DEZ.

**J6, ST. LUCIA** (NA-108)

Just a reminder that John, W5JON, will be active as J6/W5JON from Marigot Bay between March 1-11th (2009). Activity will be on 160-6 meters SSB using dipoles and 6m yagi. Also, look for activity in the ARRL DX SSB Contest (March 7-8th, 2009). QSL via W5JON.

**J7, DOMINICA** (NA-101)

John, G3LZQ, will be active as J79WR between March 5-25th. Activity will be holiday style, but he plans to concentrate on 160 and 80 meters, and participate in the upcoming Commonwealth (BERU) Contest (March 14-15th). QSL via G3LZQ.

**LT9, ARGENTINA** (Special Callsign)

Members of the Corrientes Radio Club (LU4LG), Villa Angela Radio Club (LU4GO) and Chaco Radio Club (LU4GF) will activate the special callsign LT9L from "Esteros del Ibera", March 21-23rd. The place of operation is the Ibera Interpretation Center, located on the shores of Lake Luna, Colonia Pellegrini, Corrientes Province. Access to this location is from the City of Mercedes, from which it is separated on about 120 km of unpaved road. The Center has a showroom with illustrative material about the history, geography and biology of the park. Activity will be on 80/40/20/15 meters using CW, SSB, PSK, RTTY and SSTV. Operators mentioned are: Ricardo/LU4GL (CW), Raul/LU1JB/L (CW), Luis/LU4LC (SSB), Juan Carlos/LU9GDN (SSB), Ramon/LU7LC (Digital) and Nestor/LU4LE (Digital). QSL via EA5FL JOSE MIGUEL ALCARAZ Moncho, PO Box 252, 03700 - Denia, Alicante, Spain.

**MJ, JERSEY**

Operators David/G3NKC, Dave/G4BUO, Martin/G4XUM and Phil/GJ4CBQ will be active as MJ4K during the CQWW WPX SSB Contest (March 28-29th). QSL via G3NKC.

**OM0, SLOVAK REPUBLIC**

The rare "OM0" prefix will be activated during the CQWW WPX SSB Contest (March, 28-29th) on 160-10 meters by the OM0A Contest Group. Five operators and one YL will enter the contest as a Multi-2 entry. Operators mentioned are: Villiam/OM0AAO, Martin/OM4AAS, Mimi/OM4AQW (YL), Igor/OM6ACI, Peter/OM6PR and Stevo/OM7KW. QSL via OM0AAO.

**PA750, THE NETHERLANDS**

A group of radio amateurs in the Assen region will be on the air as PA750ASN during the following periods: March 1st and April 15th, and the month of June and September. Operations will be on all bands and modes. Activity is to celebrate the 750th anniversary of Assen city located in the northeastern part of the Netherlands. Also being celebrated is the 200th anniversary (March 13, 1809) of the city's rights granted by Louis Napoleon. A special QSL card will be available on request. QSL via PI4ASN, by the Dutch QSL Bureau or direct by (QRZ.com) address. NO E-QSL.

**PJ2, NETHERLANDS ANTILLES**

A Multi-Multi contest effort as PJ2T in the ARRL DX SSB Contest (March 7-8th). Operators mentioned are (\*Desecheo Team): \*Bob/K4UEE, \*Gregg/W6IZT, \*George/N4GRN, Everett/WZ8P, David/K4SSU, Elmer/N4LR, Norman/WA4ZXV, Wayne/KU4V, Jim/W4TE, Don/N4HH, Mary/K1MMH, Harry/W4KJ, George/KI4DSO, Jim/ND4V, \*Bill/N4NX, \*Chaz/W4GKF and Geoff/W0CG. QSL PJ2T via N9AG or LoTW.

### ***TF, ICELAND***

Siggi, TF3CW, will be active in the ARRL DX SSB Contest (March 7-8th) as Single-Op/Single-Band (20m) entry. QSL via LX1NO.

### ***TT8, CHAD***

Franck, F4BQO, will once again be active as TT8CF between February 27th and July 1st. Activity will be on the HF bands using CW and SSB. QSL direct via F4BQO.

### ***V2, ANTIGUA***

Operators Norman/K1DG, John/K1QX and Martin/W1MD (V26F) will be active as V26F during the ARRL DX SSB Contest (March 7-8th) as a Multi-Single entry. QSL V26F via W1MD.

### ***V85, BRUNEI***

Kanzi, JA4ENL, will once again be visiting Brunei from March 6-9th. He will be active as V85NL and operate on all bands (including 30/17/12m), especially on 80/40/20m and the top bands mostly on CW. QSL via JA4ENL, by the JARL Bureau or direct.

Look for special event station V88NBD25 to be active until March 10th. Activity is to celebrate 25 years as an independent and sovereign nation. To mark this auspicious and historic occasion, the Brunei Darussalam Amateur Radio Association, the organizer of this special event station, launched a temporary Silver Jubilee Award which is available to all amateur radio stations worldwide and SWLs. For details, visit the Web page at: [http://www.bdara.net/calendar\\_special.html](http://www.bdara.net/calendar_special.html) Also, see details at:

<http://www.qrz.com/db/V88NBD25>

### ***VP59, TURKS AND CAICOS ISLANDS***

Dave, W5CW, will once again be active as VP5/W5CW between March 24th and April 8th. Activity will be on 160-6 meters (this will include 30/17/12m) CW/SSB. He will also be in the CQ WW WPX SSB Contest (March 28-29th) as a Single-Op/All-Band entry using the special callsign VP59V.

QSL direct ONLY via W5CW or via PO Box 88, Morris, OK 74445-0088.

### ***VP8, FALKLAND ISLANDS (SA-002)***

John, G3VPW, will once again be active as VP8KF between March 5-31st. This is about John's seventh trip to the Falkland Islands. Activity may be limited at first because he will be working at the "Stanley Ionospheric Observatory" for two weeks. However, the last 10 days are set for some DXing. He is expected to stay with Bob/VP8LP and Janet/VP8AIB McLeod (the ones that organized the YL only VP8 operation). When active, John will be on 80/40/20/15/10 meters using CW and SSB. He will also focus on the ARRL DX SSB, RSGB Commonwealth and CQWW WPX SSB Contests. QSL via his home callsign.

### ***VP9, BERMUDA***

First time DXpeditioners John/W3MF and Bob/K3PH plan to activate VP9I for the ARRL DX SSB Contest (March 7-8th). QSL via N1HRA. They may operate outside the contest as VP9/homecalls.

### ***YV5, VENEZUELA***

Operators Suer/YY5EBV, Jose/YV5BM and Jhony/YV5KG will be active as YV5KG during the ARRL DX SSB Contest (March 7-8th) as a Multi-Single/High-Power entry. QSL via YV5KG.

# THE DX CALENDAR BY SM3CVM, Lars <http://www.sk3bg.se/>

## MARCH 2009

- 1/3 BRAZIL; PX6B and PY6KW/p SA-080

from Boipeba Island by PT2OP (as PX6B) and PY6KW (as PY6KW/p or with a special callsign). They plan to operate SSB mainly on 20 and 40 metres, with 100 watts into G5RV. QSL via home calls.

- 1/3 MEXICO; XE2HWB/XF1 NA-078

from Isla Magdalena. He will operate QRP on +/- 14260 and 50120 kHz. QSL via home call.

- 2/3 TUVALU; T27A and T27OU OC-015

by N7OU and W7Yaq, their callsigns still have to be confirmed. Activity will be on 160-10 meters, mainly CW, with some SSB

and RTTY. They plan to be an entry in the ARRL DX CW Contest. QSL via their home callsigns, direct or by the Bureau.

- 2/3 IVORY COAST; TU/F8ENY

from San Pedro. He will operate mainly on 20 metres.

- 3/3 BELIZE; V3YN and V31GW NA-180

by DJ4KW (V31YN) and DK9GG (V31GW) will be active from Belize to early March, including a number of contests. From 26 February to 3 March, look for V31YN/p to be active from NA-180. QSLs via home calls (direct or bureau).

- 3/3 PARAGUAY; ZP6/SP9MRO

by SP9MRO and SP9SX will be active holiday style. They plan to operate CW, SSB and RTTY, with main activity to be concentrated during the weekends and the local night hours.

- 4/3 GRENADA; J37BO and J37RO

by K4LTA (J37BO) and K4UPS (J37RO) including the ARRL DX CW Contest as J38A. They will be joined by AK4Z, KT4E and KE4TG, who will be QRV as J3/home call.

- 4/3 CAYMAN ISLANDS; ZF2AM

by K6AM. He will also be active during the ARRL DX CW Contest (February 21-22th) and also the CQ 160-Meter SSB Contest (February 27th-March 1st). He will be doing mostly antenna work outside of the contests, but may get on the WARC bands or even 6 meters a bit as time permits. QSL via K6AM, direct or by the Bureau or LoTW.

- 5/3 MAYOTTE; FH/G3SWH and FH/G3RWL AF-027

their activity will be mainly on 80-10 metres CW. Subject to QRN and site conditions, there may be some 160m CW activity, and some RTTY and/or PSK31. They plan to have two stations on the air for as many hours every day as possible. QSL via G3SWH, direct or bureau (on-line form for bureau cards can be found at <http://www.g3swh.org.uk/mayotte.html>)

- 6/3 SEYCHELLES; S79JF AF-024

from Praslin Island by DL7JAN. Activity will be on 40-10 meters using CW, SSB, RTTY and possibly PSK31. QSL via DL7JAN, direct or by the Bureau.

- 6/3 NAMIBIA; V5/DL2SL

QSL via homecall.

- 7/3 MONTSERRAT; VP2MPL and VP2MPR NA-103

by W1USN (VP2MPR) and AA1M (VP2MPL). They plan to operate CW, SSB and PSK31. QSL via their CBA.

- 7/3 CAYMAN ISLANDS; ZF2UL NA-016

by K3UL active holiday style. He will operate mainly CW, with a focus on 160, 80 and 30 metres. QSL via home call.

- 8/3 The GAMBIA; C5

by GWØETF on holiday and hopes to do some casual operating from the hotel with 100w and a 20m dipole, mainly CW but maybe some RTTY/PSK31. He must apply for the licence upon arrival, and he hopes to get C56/GW0ETF. QSL via home call.

- 8/3 ECUADOR; HC1MD

from Tumbaco by NE8Z. He will operate CW and SSB on 160-10 metres. QSL via K8LJG.

- 9/3 ARUBA; P4ØA

by KK9A. He plans to do a casual effort in the CQ 160-Meter SSB Contest (February 27th-March 1st). He will also be in the ARRL DX SSB Contest (March 7-8th) and the CQWW WPX SSB Contest (March 28-29th). He will not be very active outside the contests but will likely spend sometime on 40 meters CW. QSL via WD9DZV.

- 9/3 GUANTANAMO BAY; KG4CN NA-015

Had to postpone his trip to Guantanamo. The new dates are 10-20 April (to be confirmed).

- 10/3 BRUNEI; V85NBD25

Special event station is active until 12 UTC on 10 March to celebrate the 25th anniversary of Brunei as an independent and sovereign nation. Information on the relevant award can be found on the Brunei Darussalam Amateur Radio Association's website <http://www.bdara.net/>

- 10/3 ANTARCTICA; OR4AX and OR3AX

from the RV Professor Khromov (Spirit of Enderby) and from the region of the Ross Sea in Antarctica by ON5AX and ON3AX. QSL via ON5AX.

- 12/3 NAMIBIA; V5/DJ4SO

He will operate mostly CW and RTTY/PSK31 on 160-10 metres. QSL via home call, direct or bureau. The logs will be uploaded to LoTW.

- 12/3 ANTIGUA; V25TK NA-100

by G3TKK, active holiday style. He plans to operate CW on 40-17 metres. QSL via G3TKK, direct or bureau.

- 19/3 ST. MAARTEN; PJ7/W8EB and possibly PJ7/W8DVC  
Activity will be on 160-10 meters, CW, SSB, RTTY and PSK31. Operations will be limited because he is on holiday. Bil will operate in the ARRL DX SSB Contest (March 7-8th) as PJ7B, and as a Single-Op/All-Band/Low-Power entry. Also look for him to be in any RTTY contests. All QSL requests go to W8EB. Visit their PJ7B Web site at <http://www.qsl.net/pj7b/>

- 23/3 MALAWI; 7Q7AH  
by GØIAS for one month. He will try to erect an antenna for 160 metres. QSL via G0IAS, direct only.

- March LEBANON; OD/IV3YIM  
He operates SSB and RTTY on 10, 15, 20, 40 and 80 metres, with some possible activity on CW, PSK and the other bands. QSL via home call, direct or bureau.

- March BHUTAN; A52VE  
by JA8VE. He had to leave Bhutan on September 3rd due to health problems. QSL via JF1OCQ.

- March CHAGOS ISLANDS; VQ98JC and VQ9JC AF-006  
from Diego Garcia by ND9M. He is active as VQ98JC through the end of the year, after that he will use VQ9JC. Expect him to be QRV in his spare time, typically on 12-16.30 UTC (from Sunday to Thursday) and on 12-17.30 UTC (Fridays and Saturdays). Occasional overnight operating will allow him to remain QRV until 1 UTC. QSL via ND9M.

- March ANTARCTICA; VKØBP  
from the Davis Basis (main island only) by VK2ABP/VK2MRP. QSL via VK2CA (see QRZ.com).

### ***DX-PEDITION HELP WANTED***

We need a good support & sponsors for next dx expedition on MOGADOR island (Marocco)  
IOTA AF-065 ww.loc. IM51CM ITU 37 CQ 33

Date : 18/26 April 2009.

Team of the 9 operators :

5C2A - 5C2C - 5C2F - 5C2G - 5C2J - 5C2L - 5C2SG - 5C2Z - 5C2Y

Essaouira IM51CL /P : Mogador island IM51CM /M : Lighthouses A.R.LH.S.

MOR-019 Cape Sim-Essaouira IM51CL MOR-036 Sidi Magdul-Essaouira IM51BJ

MOR-O40 Grand Jetée-Agadir IM50EJ

QSL via bureau > see the letter of the suffix :

A via IK2AQZ, C via IK6CAC, F via I2FUG, G via IZ7GWZ,

J via IK7JWX, L via I8LWL, SG via IZ7ATN, Z via I8YGZ,

Y via I0SNY.

All HF, VHF, WHF bands, all modes (SSB, CW, M.S., RTTY, PSK31).

Pse, reply to : [ik7jwx2003@yahoo.it](mailto:ik7jwx2003@yahoo.it)

73 de Alfredo IK7JWX

Sign the guestbook at :

[www.sazan2008.altervista.org](http://www.sazan2008.altervista.org)

[www.myspace.com/ik7jwx](http://www.myspace.com/ik7jwx)

# ZA0 SAZAN ISLAND DX'PEDITION BY IK7JWX

My second adventure in Albania on the island of SAZAN:

Iota EU-169, M.I.A. MA-001, Lh. ARLHS ALB-04, ALB-019, ALB-020, WLOTA L-0028.

I would like to describe the sense of joy and the strong emotion, that I felt when I have just arrived on the island of Sazan : the return after six years has been wonderful, especially with the very nice company, formed this time by great Italian friends.

After having gotten all the permissions, both Albanian and Italian, begun the organization of our radio equipments, antennas, amplifiers, etc.

The group components was :

Alfredo IK7JWX from Lecce, Nicola I0SNY from Perugia, Pino I8YGZ from Nocera Superiore, Leopoldo I8LWL from Castellammare di Stabia, Oscar IZ2AQZ from Como.

We installed a Windom HF, a directional Spiderbeam HF, a vertical by I1UJX and dipoles for 40, 80, 160 m., besides directionals for VHF and 50 MHz.; for a total of 4 stations on SSB, CW, digital PSK31 e RTTY, one VHF station also for Meteor Scatter traffic (op. Pino I8YGZ).

One of the station had a ICOM 7400 with TL922 amplifier, two stations were equipped with two Yaesu FT450, a IC7000 and linear amplifiers, always monitoring 50.140 MHz. for a possible E-Sporadic.



We have always operated at the same time on 3 (some times on 4) bands.

At the end of this fantastic adventure (total QSO 15.228), we want to thank Mr. Gazmend Oketa of the Albanian Office of the Defense, Mr. Besnik Gjonbati of the Albanian Army Forces, the Command of Italian Marines, the commander C.F. Russo Vittorio and the whole 28° Gruppo Navale for the perfect logistic support and great hospitality received, the Delegazione Italiana Esperti (D.I.E.) of the Italian Embassy of

Tirana, the Command of Guardia di Finanza of island of Saseno, the A.K.E.P. office (particularly Lady Dervishi e Mister Ilir Shehu) for the temporary licenses ZA0/, the friends C.V. Tiziano Peretti IW0EVL and Coppola Tommaso IZ7JXQ for their precious help, our very good pilot Pasquale IZ8GDO for the compilation of ours beautiful QSL.

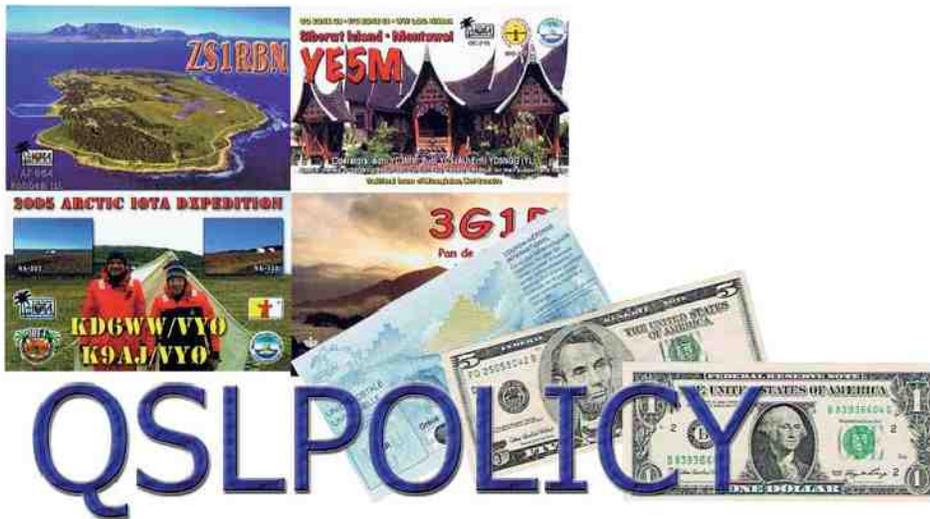
Many THANKS to ours sponsors all (See the links in our website) !

We also thank all OM's that had QSO with us and allowed the total of 15.228 contacts.

The ZA0/2008 team invite all to read the various infos on our activity and to see many pictures on our website (in continuous updating) edited by Aldo IZ8IDX : <http://www.sazan2008.altervista.org> (Don't forget to sign the guest book).

More info on : <http://dx-hamspirit.com> - <http://www.mdxc.org> - <http://www.myspace.com/ik7jwx>





WINQSL

Manfred Meier

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WINQSLPOLICY is a 32bit-application and runs under all current Windows-Releases from WIN98 up to VISTA. When you've downloaded the file from the website just open QSLPOLICYSETUP.EXE with a double-click. In the selection-window you can choose if you like the default-setup-directory (which install directly under the WINDOWS program-directory in a sub-directory QSLPOLICY). Of course you can select also an individual installation-directory.

After installation you find a new Icon on your desktop called QSLPOLICY.

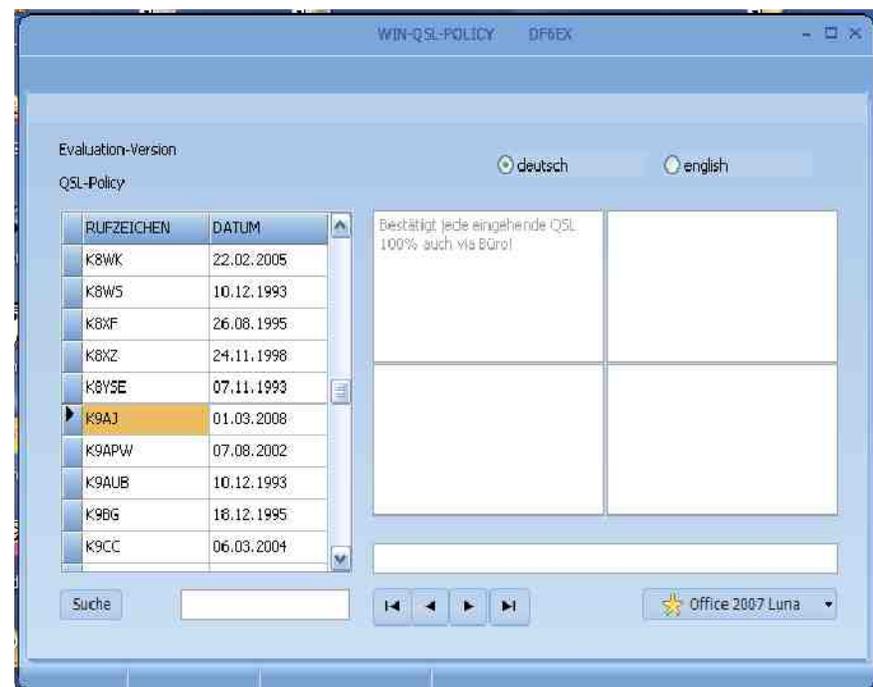
After starting the program it appears with the sentence Evaluation-Version in the headline.

You can start it up to 100 times but then you have to install a licence-file or the program will no longer work.

Conditions how to get a licence you will find at the homepage: [www.winqsl.de](http://www.winqsl.de)

In the database-browser you find

RUFZEICHEN	DATUM
K8WK	22.02.2005
K8W5	10.12.1993
K8XF	26.08.1995
K8XZ	24.11.1998
K8YSE	07.11.1993
K9AJ	01.03.2008
K9APW	07.08.2002
K9AUB	10.12.1993
K9BG	18.12.1995
K9CC	06.03.2004

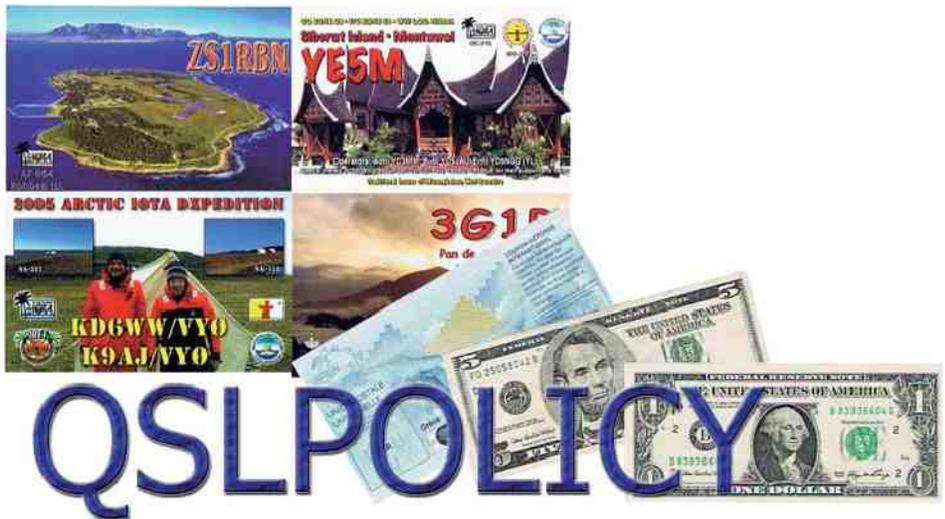


beside the call a date-field. This date represents when the info was inserted or last time modified.

After the start of QSLPOLICY the cursor remains blinking in the search-field. Just enter the wanted DX-call or manager-call and press the Enter-Button. If a record was found the database moves and display the recorded QSL-policy.

Also when the cursor is in the search-field you can scroll throuh the database by pressing the arrow-up or arrow-down-key.

Of course you can move also with clicking one of the four arrow-buttons with the mouse to the next/previous/first/last record.



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WINQSL

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### Order-Form WIN-QSLPOLICY Club-Licence

Yes, we want a WINQSLPOLICY-club-licence

Name of club:

club QSL-Manager:

e-mail-address:

\_\_\_\_\_, \_\_\_\_\_  
\_\_\_\_\_  
Signature Club-official

# The Versatile 995x Board

By WB6DHW - Dave

DDS(Direct Digital Synthesizers) are magical integrated circuits. Put in a few 1's and 0's on one end and you get a sine wave out the other end. Analog devices makes the most popular line of DDS chips. Prior to the recent introduction of the AD9910 and AD9912, the AD9951 through AD9954 chips were the highest performing devices. They are available at reasonable price (\$24.54, qty. 1, from DigiKey). Analog Devices also has a very generous free sample policy. <http://www.analog.com/>



The purity of the sine wave and the level of spurious outputs are related to the number of bits in the internal D/A(digital to analog) converter, the clock speed, and the programmed frequency. The AD995x series uses a 14 bit D/A(as opposed to 10 bits in the earlier DDS's such as the AD9850). The maximum specified clock speed is 400 MHz, although every device I have tried has clocked to at least 500 MHz. Generally, the more bits in the D/A, the lower the spurs.

One problem with the DDS chips is they are all fine pitch(0.5mm center to center pin spacing). A second problem is the requirement for either a computer or processor to program the desired frequency. A PC board is necessary. Either an on-board processor with keyboard input and LCD readout or a connection to a computer is required. A low noise 400 or 500 MHz oscillator is also required.

With the recent popularity of Software Defined Radios such as the Softrock , <http://groups.yahoo.com/group/softrock40/>

I decided to control the board from a PC. The Softrock already requires the PC to provide the filtering and demodulation functions. An AD995x(x=1 to 4) would provide a programmable local oscillator(LO) from VLF to VHF. With a 500 MHz clock, the AD995x can provide output up to 200 MHz with 0.116 Hz frequency steps! Because many notebooks and some new desktops no longer have parallel or serial ports, it was decided to use a USB port for control. Because the Softrocks required 2 LO signals in quadrature(2 signals the same frequency but 90 degrees apart in phase – also called I and Q), a quadrature generation circuit was added.

The block diagram of my 995x board is figure 1. As in many designs, feature creep came in. I added a QSD(quadrature sampling detector) to make the board a Software Defined Radio(SDR). Since the board would have an on-board processor, I added a programmable attenuator and a power measurement integrated circuit to allow the setting of output power. The R2 revision of the board contains a modification to allow breaking the connection from the RF output to the input to the power meter. This allows the board to be used as a SNA(scalar network analyzer) from VLF to 200 MHz. Available free SDR software allows the board to be a receiver or a narrow band spectrum analyzer. Additional software could be written to turn the board in to a spectrum analyzer covering VLF to 10MHz.



Figure 3 and figure 4 are the schematic of the DDS and associated support circuitry. A separate regulator is used for each of the 3 power supplies required by the DDS. In addition a lot of bypass capacitors and careful circuit layout are employed to keep the digital signals out of the analog circuits.

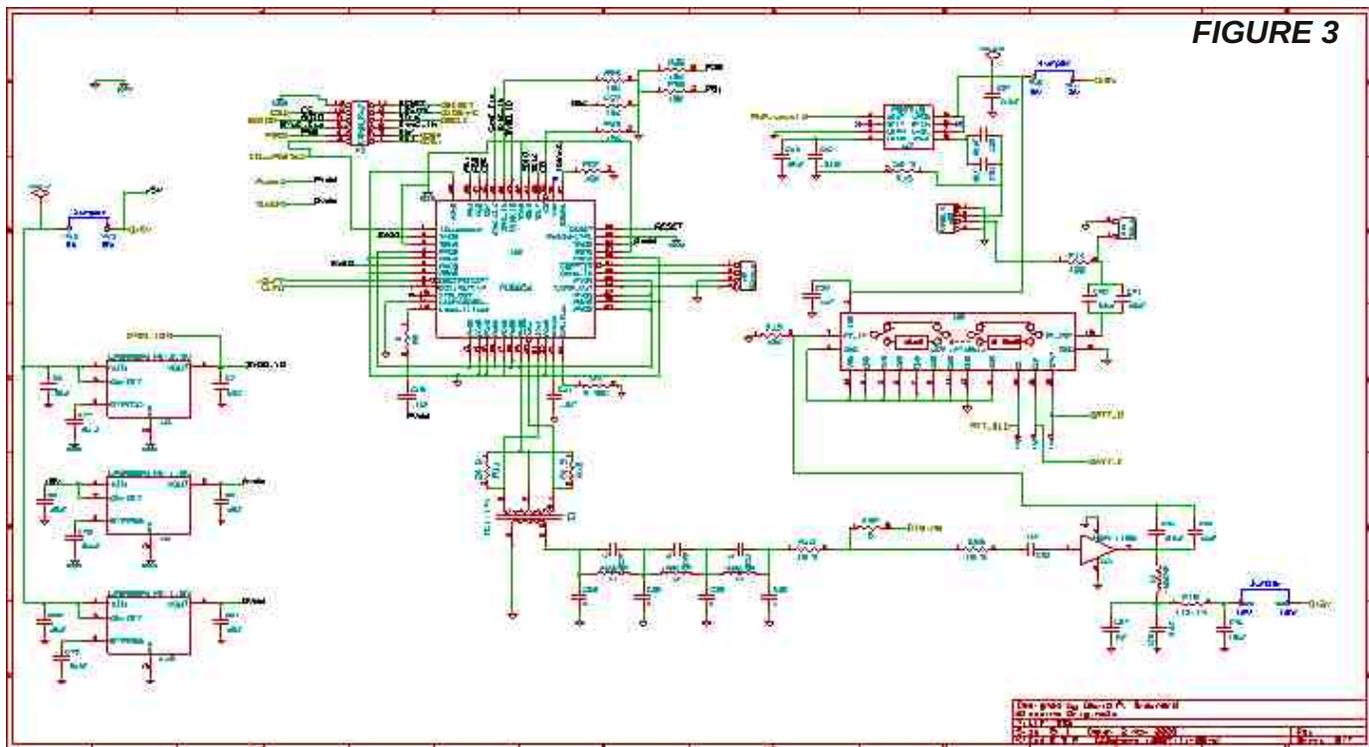


FIGURE 3

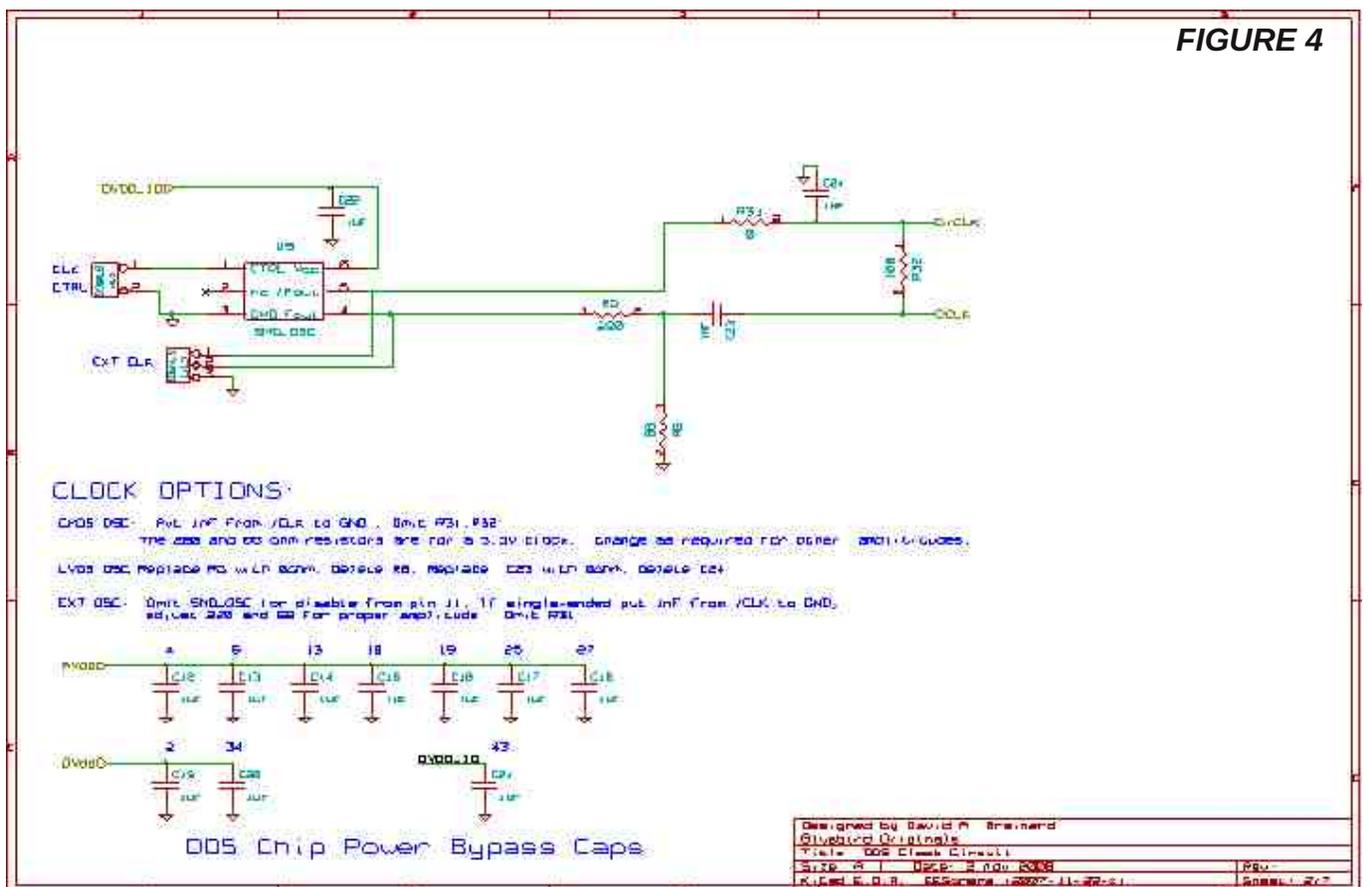


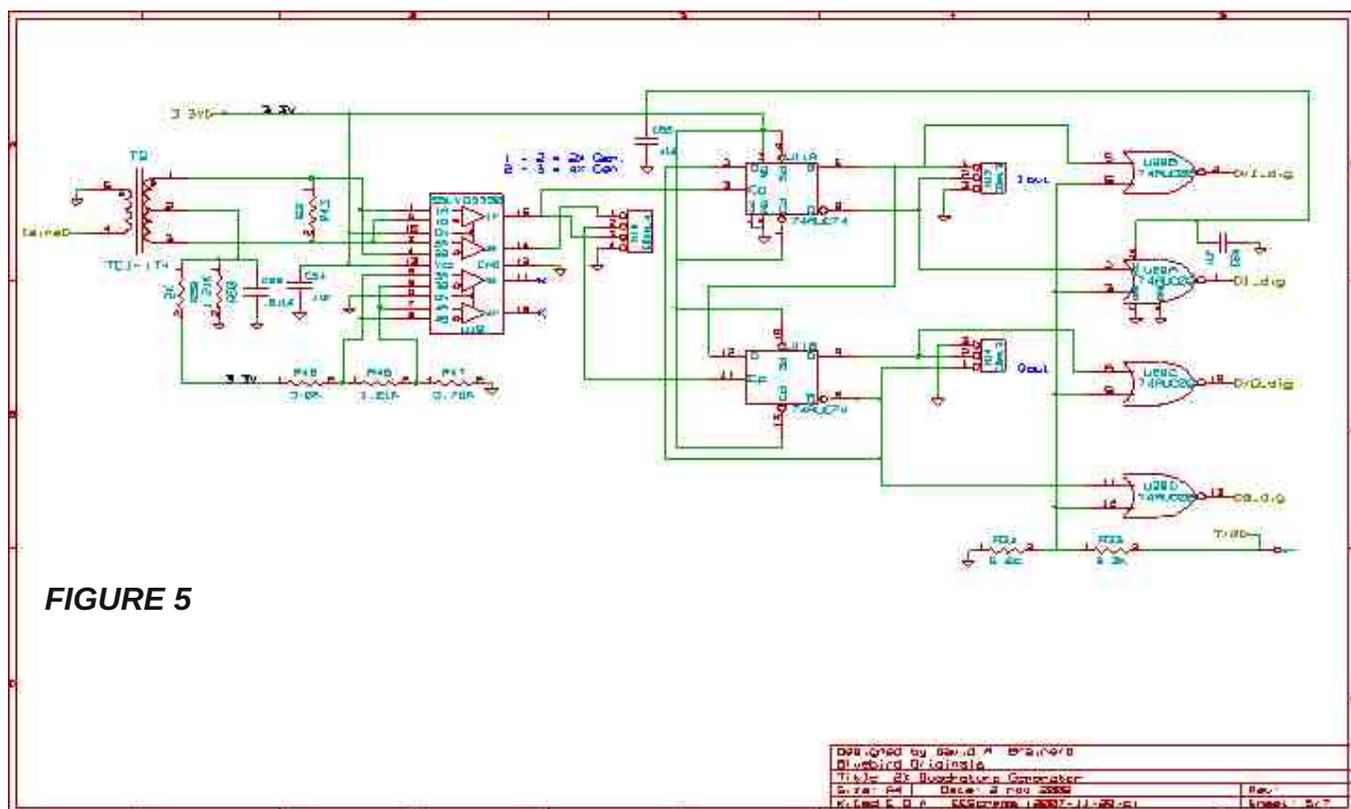
FIGURE 4

A 125 MHz “can” crystal oscillator is used for the DDS clock. The output phase noise is dependent on the clock. The clock selected does not use a PLL to generate the 125 Mhz. This guarantees no spurs and lower phase noise. It is low cost but has a reasonably low phase noise. The DDS internal PLL is used to generate a 500 MHz DDS clock. The board has provision for an external clock input for those desiring ultimate performance. The 125 MHz crystal oscillator may be replaced by a 100 MHz oscillator for those not wishing to push the DDS beyond its specification of 400 MHz.

A DDS is a sampled system. Therefore, outputs appear at  $mF_{clock} \pm F_{programmed}$  (m is any integer,  $F_{clock}$  is the clock frequency, and  $F_{programmed}$  is the programmed frequency). A low pass filter is required to remove the undesired aliases. With a 500 MHz clock, C26-C32 and L1-L3 form a LPF(low pass filter) with a cutoff frequency of 200 MHz.

The output of the LPF is split in two. One output goes to the mmic amplifier and the programmable attenuator. The other output goes to the quadrature generator circuit. If the programmable attenuator output is coupled to the power meter, the PIC processor can monitor the output level and adjust the attenuator to achieve a desired output level. Alternately, the attenuator output can be applied to an external circuit. If the output of the external circuit is connected to the power meter, a scalar network analyzer is created.

Figure 5 is the quadrature generator schematic. The RF sine wave is split into two phases 180 degrees apart in transformer T2. These two phases are converted to square waves by 2 LVDS line receivers. One or both of these square waves are applied to the two 74AUC74's to produce 4 outputs 90 degrees apart. H18 selects the clock source for the 2nd 74AUC74. If both are clocked from the same signal, the output is at 1/4th the input frequency. If the 2nd 74AUC74 clock is 180 degrees out of phase with the 1st, the output frequency is 1/2 the input frequency. The four digital outputs connect to the QSD circuit through U20. The T/R( transmit/receive) signal, when pulled high for transmit, prevents the signals from reaching the QSD circuit.





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