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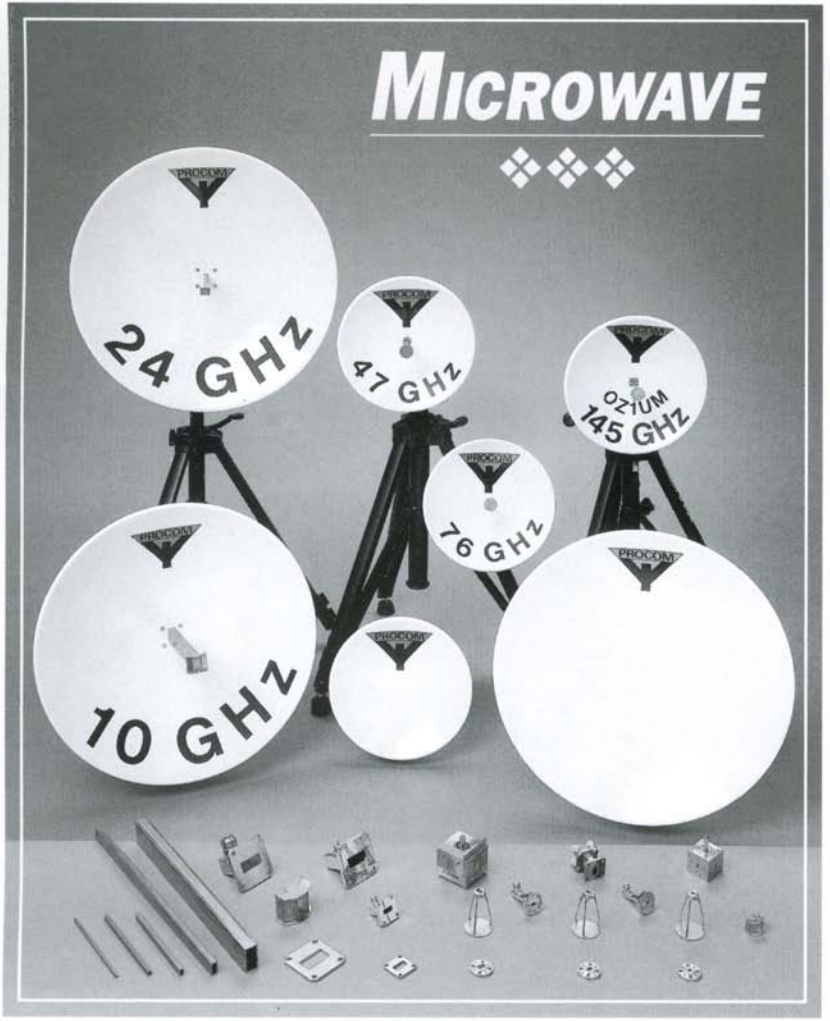

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Inhalt / Content 1/03

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Editorial

Dear DUBUS Reader!

Here is the first issue for the new year 2003. We hope that you will like it.

After 6 months we are now back to the normal timing with this issue. Due to the delay which was caused by DJ9BV´s illness in mid 2002 we had to produce the last four issues (issue 2/2002 to issue 1/1003) within only 6 months. This is just half of the normal time, so we have to apologize for any small errors in those issues. In future we will have more time for editing. Anyway a big "Thank You" to all who have helped during this busy time with articles, contributions, translations etc! From now on the normal deadlines for DUBUS will be:

Issue	Deadline/Termin	Post
1	February 20th	March 1st
2	May 20th	June 1st
3	August 20th	September 1st
4	November 20th	December 1st

In this issue you will find the results of our readers`s poll. Of course, the big majority of the readers did not take part, which is quite normal. So probably the majority is quite satisfied with DUBUS like it has been in the past. Anyway we will try to realize some of the most wanted suggestions we got from the participitiants. DUBUS will always be open for any suggestions also in the future, of course.

Here a few items that are important for us:

1.) We are looking for a new editor of the MS (Meteor-Scatter and FSK/WSJT) column. DL8LAQ wants to give this to someone else, as he has already a lot of work to do with his Sporadic-E and Toplist columns. Please contact DL8LAQ or me, if you are interested.

2.) We are looking for someone who could help us from time to time with translations of technical articles from English into German and vice versa. Any offers please to dubus@web.de Many thanks!

3.) In the News & Comments column of this issue you will find something about a joint effort to set up 2m and 6m beacons (for TEP and transatlantic propagation). We would be happy to get some feedback regarding this project.

Vy 73 from Joe, DL8HCZ / CT1HZE
and the DUBUS team!

Liebe DUBUS Leser!

Hier ist nun die erste Ausgabe für das Jahr 2003. Wir hoffen, dass sie wieder lesenswert ist.
Nach 6 Monaten sind wir mit dieser Ausgabe nun wieder in der regulären Zeitplanung bzw. Erscheinungsweise angelangt. Aufgrund des krankheitsbedingten Ausfalls von DJ9BV Mitte 2002, mussten die letzten 4 Ausgaben (2/2002 bis 1/2003) innerhalb von nur 6 Monaten auf die Beine gestellt werden. Dies ist genau die Hälfte der normalen Zeit! Wir möchten uns deshalb auch noch mal für die Tippfehler u.a. entschuldigen. In Zukunft werden wir hoffentlich mehr Zeit auch zum Korrekturlesen haben. Auf jeden Fall möchten wir uns nochmals herzlich bei allen bedanken, die uns in dieser Zeit mit Artikeln, Einsendungen und Übersetzungen unterstützt haben!! Ab sofort gilt für die DUBUS der nebenstehende Zeitplan (siehe Kasten links).

In dieser Ausgabe haben wir auch die Ergebnisse der Leserumfrage veröffentlicht. Wie üblich hat die große Mehrheit der Leser natürlich nicht teilgenommen. Das ist normal und wir werten das als Zeichen dafür, dass man mit der DUBUS, so wie sie bisher war, ganz zufrieden war. Dennoch werden wir natürlich versuchen, einige der besonders oft von den Einsendern vorgeschlagenen Anregungen umzusetzen. DUBUS wird natürlich auch in Zukunft für Anregungen immer offen sein.

Hier einige weitere wichtige Punkte:

1.) Wir suchen einen neuen Redakteur für die Rubrik MS (Meteor-Scatter und FSK/WSJT). DL8LAQ möchte diese Rubrik abgeben, da er mit Sporadic-E und der Topliste ausreichend zu tun hat. Interessenten können sich gerne bei DL8LAQ oder mir melden.

2.) Wir suchen gelegentlich Hilfe bei der Übersetzung von technischen Artikeln (von Englisch ins Deutsche und auch umgekehrt). Wenn jemand helfen kann, würden wir uns freuen. (Bitte Info an dubus@web.de).

3.) In der News & Comments Rubrik dieser Ausgabe haben wir ein Bakenprojekt angeregt, um vernünftige Baken auf 2m und 6m für TEP und Transatlantik-Versuche zu haben. Wir würden uns über Vorschläge, Kommentare bzw. ggf. Beteiligung an diesem Projekt sehr freuen.

Vy 73 von Joachim, DL8HCZ / CT1HZE
und vom ganzen DUBUS-Team!

A simple TWT Tester

Marko Cebokli S57UUU

Abstract
When one wants to get useful RF power from TWTs bought randomly at fleamarkets and junkyards, the testing of these tubes usually presents a big problem. A suitable power supply is rarely available, especially for the more powerful tubes. Often these tubes are near (or beyond :-)) the end of their useful life, the focusing is degraded etc. Sometimes they can still give useful power, provided one can experiment with them for a while. This article describes a relatively simple device for testing and safe (for the tube) debugging of TWTs with widely varying power requirements.

1. The problem

Here are some of the problems the TWT experimenter encounters in his life:

- You've got a nice big tube but no power supply. Before starting to build or otherwise invest in the big and complicated supply, it would be nice to know if the tube works at all!
- You've got the tube and supply but no heatsink. A few hundred watts of heat will fry the tube in seconds without a heatsink. How to test it?
- You've got everything, but the helix protection trips instantly when you apply the power. Maybe only a slight adjustment of the voltages or a small magnet would help, but how to find the solution without exposing your tube and supply to the repeated stress of aborted switching?
- You've got an 'UFO' tube, no data, not even who the manufacturer is. Using some tube sleuthing you can, with some confidence, find out which terminal is which electrode, but how to find out what voltages to apply without burning the tube out?
- You've got everything but that big RF dummy load. Now, you could hook up that horn, but your neighbour's brain has been washed with those fairy tales about extremely dangerous microwaves...

2. Pulsed testing

One solution to the above problems is to switch the tube on just for a few (tens of) microseconds. For such a short time, it's possible to supply a lot of power from a capacitor which is charged by a simple small low current high voltage supply.

Another advantage of using short pulses is that because of the thermal mass of the tube elements, the maximum ratings of the tube for continous operation can be exceeded by a big factor without endangering the tube's health. Fig 1 shows the basic idea.

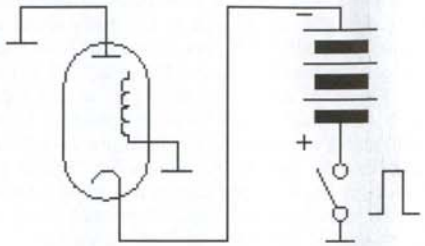


Fig. 1 Principle of pulsed TWT testing

In fact, only the helix supply has to be switched since the TWT will then switch its own collector current (Fig 2).

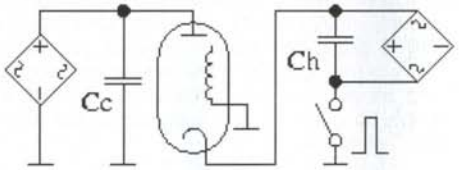


Fig. 2 Separate supplies for helix and collector

The switch is connected with its negative side to ground. In this way a tube (or maybe a string of transistors) can be used as the switch. This causes some problems with the capacitor charging supply, which must float. The switch is controlled by a monostable multivibrator which determines the pulse width. If a suitable storage oscilloscope is available, it can be triggered by a debounced pushbutton in a single-shot way. Otherwise, a low frequency (tens of Hz) oscillator can trigger it periodically so that any oscilloscope can be used to view the pulses. The duty cycle shold be kept below 0.1% to keep the average power requirement and dissipation low.

3. Supplying the collector(s)

Because of the huge dissipation margin, the stages of a multi-collector tube can be connected together and operated at the first collector's

voltage. With continous operation this is not allowed, because the last collector would take most of the current and overheat. When pulsed, the collector(s) can even be operated at helix voltage (Fig 1), but a separate energy storage capacitor is still desirable to reduce the voltage drop on the helix during the pulse.

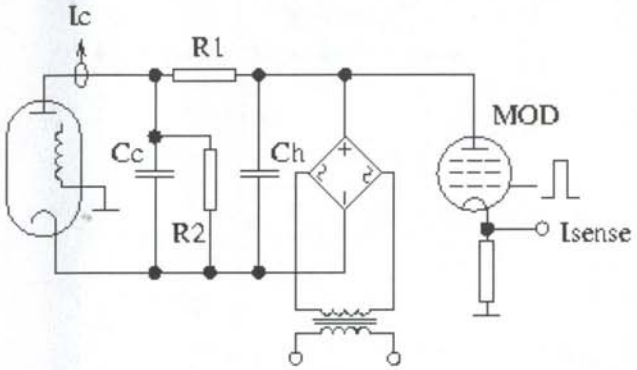


Fig. 3 Common supplies for helix and collector

Both can be fed from the same supply, with a resistor between them for decoupling. In the repetitive pulse regime, this resistor can be dimensioned so that the voltage drop across it will give the correct collector voltage. In single-shot mode a full voltage divider (add R2 across the collector capacitor - Fig 3) is required for that purpose. Observe the power and voltage ratings of the resistors! Collectors are not very sensitive about their voltage as long as it is above the minimum required.

The collector current is not accesible at ground potential, but since it is pulsed, a small (well insulated) current transformer can be used to measure it (Fig 3).

4. Storage capacitors

Their capacitance is determined by the voltage drop that can be tolerated during the pulse. The basic equation is dV/dt = I/C and therefore C = I*dt/dV. For example, a 50V drop during a 100us pulse at 100mA load current gives

C = 0.1*0.0001/50 = 2E-7 or 200nF (0.2uF).

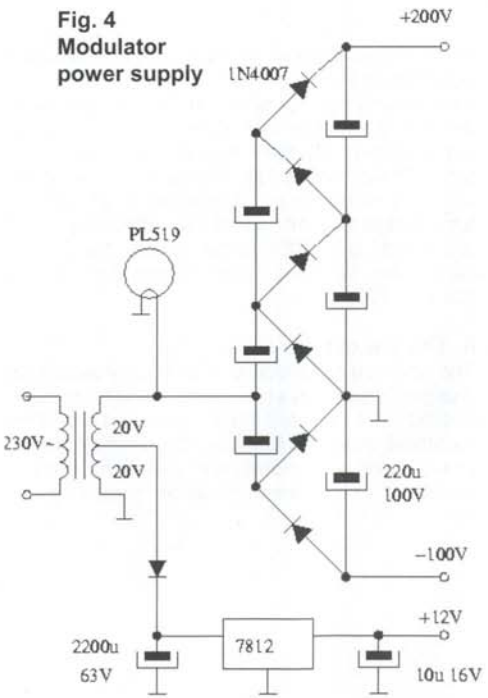
Since the helix requires a more constant voltage but draws less current than the collector, a similar value of capacitor can be used for both.

5. The switch

I have used a PL519 pentode that once served for TV line deflection. It is specified for up to 8kV of pulsed anode voltage. Since here the voltage is present across the tube most of the time (it's the current that is pulsed), I'm afraid it will flash over one day. On the other side, the current and dissipation in this circuit are far below the tube's maximums. This is a 'P' series tube, built for 300mA series connected heaters. It's a bigger tube, so it needs 40V filament voltage at 300mA. I used a 20+20V transformer and derived all the required voltages from it (Fig 4): 40V filament, +12V for the solid state circuits, +200V for second grid and -100V for first grid.

A simple circuit with two 555's provides a pulse train to drive the PL519 (Fig 5). The bottom one is connected in astable mode and can be set with the 'freq' potentiometer between cca 2 and 20Hz, to enable viewing of the pulse waveforms on a non-storage oscilloscope. It triggers the upper one, which is wired as a one-shot and determines the width of the pulse, which can be set with the 'width' potentiometer between cca 5 and 100 microseconds. The three transistors amplify the pulses and shift the levels to values appropriate for driving g1 and g2 of the PL519.

Fig. 4 Modulator power supply



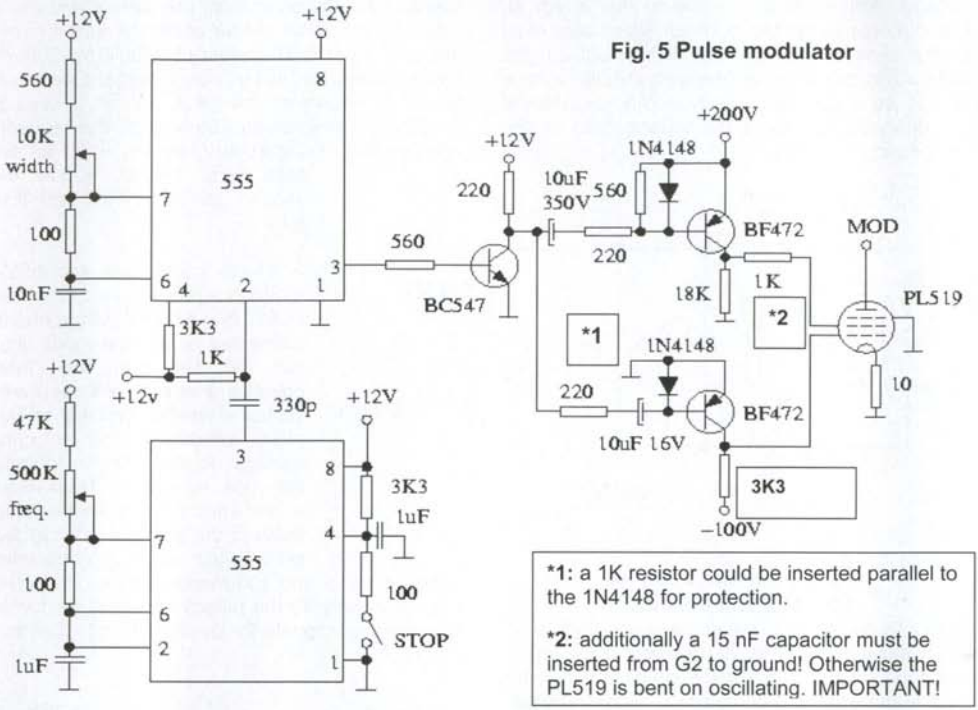


Fig. 5 Pulse modulator

***1:** a 1K resistor could be inserted parallel to the 1N4148 for protection.

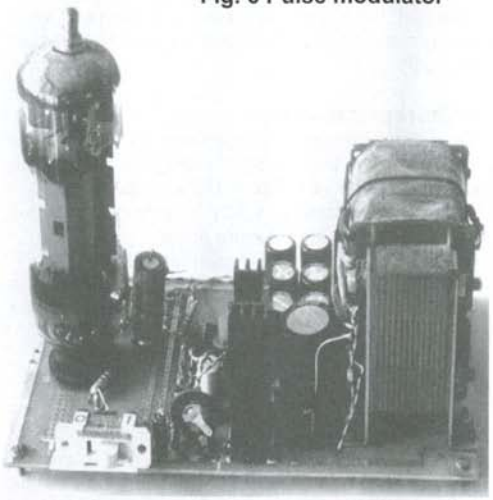
***2:** additionally a 15 nF capacitor must be inserted from G2 to ground! Otherwise the PL519 is bent on oscillating. IMPORTANT!

Fig 6 shows a photo of my prototype modulator switch using PL519.
I soon found out that at g1=-100V and g2=+200V, the PL519 starts to 'leak' current at about 2kV of anode voltage. On the other side, with g1=0V and g2=0V it won't open fully. That's why I added the circuit to modulate g2 in addition to g1. So the tube is operated with g1=-100V, g2=0V for cutoff and g1=0V, g2=+200V for conduction. Maybe with -200V bias for g1 it could be operated with g2 fixed at +200V.

6. The low current HV supply

The only non-trivial demand on the HV supply for charging the energy storage caps is that it must be floating (well insulated transformer). It is nice if it's regulated, but not mandatory. If one monitors the voltage with a suitable HV voltmeter, even a variac/neon transformer + rectifier combo can be used.

Fig. 6 Pulse modulator



7. Grids and anodes

Usually, the TWTs have some extra electrodes between cathode and helix. The required voltages vary widely, but luckily the current consumption is low. That means one can use simple resistive dividers. Manufacturers mostly specify that at switch on, these voltages must rise in proportion with the helix voltage, or else must come up last. If the divider is connected as shown in Fig 7, the voltages will rise proportionally.

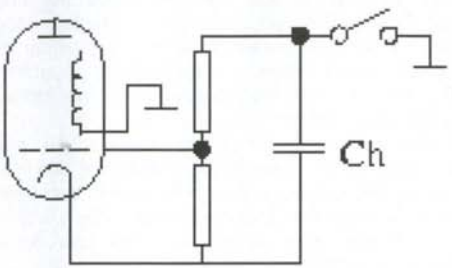


Fig. 7 Grid voltage divider

The current through the resistors will flow only during the pulse. To prevent the stray capacitances of the wires and electrodes from influencing the shape of the voltages, the resistance of the divider should be relatively low. Since current flows only during the short pulse, the power rating of the resistors is not the problem, provided they can stand the voltage (flashover). The lower limit on their resistance is set by the droop they would cause on the helix capacitor voltage during the pulse.

Alternatively, one could add a small capacitor between grid and cathode to delay the voltage rise on the grid.

In some tubes, the beam can be turned on and off by a single grid. In that case, one can eliminate the big modulator for the helix voltage and make only a small one for the modulating grid, with the helix voltage permanently applied to the tube. The problem is that the grid modulator has to work close to cathode potential. Perhaps a pulse transformer could be used.

8. How to use it

Switch on the TWT heater. This is usually 6.3V, up to a few amps for bigger tubes. Use a well insulated transformer, since it must withstand the full helix voltage between primary and secondary!! Also try to reduce stray capacitances here (short wires etc).

Wait for the prescribed warm-up time (a few minutes typically).

Connect an oscilloscope to monitor at least the helix current and desirably the collector current on a secondscope channel. Initially, I intended the 10 ohm resistor in the cathode of PL519 for helix current monitoring, but sometimes the G2 current of PL519 will distort the picture, so it's necessary to put a separate resistor in the helix (ground) lead of the TWT to monitor helix current.

Apply the high voltage and switch on the modulator. If you have a (digital) storage oscilloscope, turn on modulator at lowest frequency for just a few pulses (the 'STOP' switch, Fig5).

If the tube is OK, the helix current should be something like Fig 8, and you should have full collector current. The 'horns' on the helix current pulse are caused partly by stray capacitances and partly because of poor focusing during the rise time of the voltages. These horns can be several times higher than the maximum allowed helix current, but that's normal - don't worry about them.

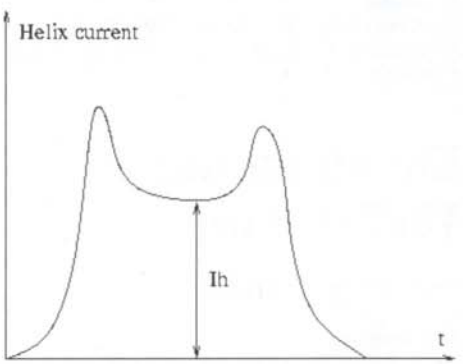


Fig. 8 Helix current shape

The steady state helix current, which is important in CW operation of the tube. equals the midpoint 'valley' value of the waveform. If the valley isn't flat in the middle, try lengthening the pulse. If you have a suitable HV oscilloscope probe, also check the rise time of the voltages to see if they are ok (less than 1/4 of pulse width) and when the current overshoot should end.

When tuning up the tube DC-wise, your goal is to get most electrons through the tube to the collector - that means lowest possible midpoint helix current. Most of the cathode current should end as the collector current, which should be close to the specified value for the tube. If the currents aren't what they shold be, try varying the voltages and applying magnets to the (cathode end of the) tube. Changing the heater voltage could also help.

If you manage to get good values for the currents, then you can apply RF. Use a suitable coupler at the output which will give you cca 10..100mW of

peak power and a diode detector connected to an oscilloscope to monitor power. The detector can be calibrated using low power CW RF and DC coupling on the scope.

9. Conclusion

A reatively simple circuit, using mostly off-the-shelf components enables one to do many measurements on TWTs, including ones that are not possible or safe for the tube with normal power supply in continous regime. This includes reviving and refocusing of old and/or damaged tubes. By using short pulses, one can also avoid thermal and RF loading problems and test high power tubes with a small low-current HV supply.

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[2] Marko Cebokli S57UUU: A TWT Power Supply, Proceedings of the VII int. EME conference 1996, Washington DC

Ein einfacher TWT-Tester

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Einführung

Wenn man brauchbare HF-Leistung aus TWTs (Wanderfeldröhren) herausbekommen möchte, die man zufällig auf Flohmärkten oder vom „Schrottplatz" bekommen hat, stellt das Testen dieser Röhren normalerweise ein größeres Problem dar.

Eine passende Stromversorgung ist meist nicht vorhanden, besonders wenn es sich um Röhren der höheren Leistungsklasse handelt. Oft befinden sich diese Röhren nahe am Ende ihrer Lebenserwartung (oder darüber), die Fokussierung ist bereits verschlechtert etc. Manchmal liefern diese Röhren aber noch brauchbare Leistung, vorausgesetzt man experimentiert ein wenig. In diesem Artikel wird eine einfache Schaltung beschrieben, mit der man TWTs testen und Fehler (für die Röhre gefahrlos) beseitigen kann. Dabei wir ein relativ breiter Leistungsbreich abgedeckt.

1. Die Probleme

Hier einige der Probleme, die beim Experimentieren mit TWTs auftreten können:

- Man hat eine schöne größe TWT, aber kein Netzteil dafür. Bevor man nun ein teures und kompliziertes Netzteil baut oder kauft, möchte man wissen, ob die Röhre denn überhaupt funktioniert.
- Man hat eine Röhre und ein passendes Netzteil, aber keinen Kühlkörper. Ein paar hundert Watt Wärme würden die Röhre innerhalb von ein paar Sekunden zerstören. Wie kann ich trotzdem die Röhre testen?
- Man hat alles komplett, aber der Helix Schutz löst sofort aus, wenn das Netzteil eingeschaltet wird. Evtl. ist nur eine minimale Justierung einer der Spannungen oder ein kleiner Magnet nötig, um Abhilfe zu schaffen. Aber wie findet man die Lösung, ohne Röhre und Netzteil der dauernden Beslastung des abgebrochenen Einschaltvorgangs auszusetzen?
- Man hat eine „UFO"-Röhre vorliegen, d.h. man weiß nichts, hat keine Daten, nicht mal den Hersteller. Mit einigem Spürsinn kann man herausfinden, wo welche Elektrode sitzt. Aber welche Spannungen sind anzulegen, ohne die Röhre gleich zu zerstören?
- Man hat alles, nur keine passende Dummy Load. Man kann natürlich das Horn anheizen, aber will man den Nachbarn gefährden, der schon so viele Märchen über die schrecklichen Mikrowellen gehört hat?

2. Gepulstes Testen

Eine Lösung für die oben aufgezählten Problem ist, die Röhre nur für einige (Zehntel) Mikrosecunden einzuschalten. Für diesen kurzen Zeitraum kann eine hohe Leistung mittels eines Kondensators zur Verfügung gestellt werden, der von einem einfachen HV-Netzteil bei sehr niedriger Stromstärke aufgeladen wird. Ein weiterer Vorteil der kurzen Testimpulse besteht darin, dass man die maximalen Grenzwerte der Röhre für den Dauerbetrieb um ein Vielfaches überschreiten kann, ohne die Röhre ernsthaft zu gefährden. Abb. 1 zeigt die Grundidee der Schaltung.

Tatsächlich braucht nur die Helix-Versorgung geschaltet werden, da die TWT dann selbst den eigenen Kollektorstrom schaltet. (Abb. 2)

Der Schalter ist auf der negativen Seite an Masse gelegt. So kann eine Röhre (oder ggf. eine Reihe von Transistoren) als Schalter benutzt werden.

Dies verursacht aber Probleme mit der Ladeschaltung für den Kondensator, die puffern muss.

Der Schalter wird durch einen monostabilen Multivibrator kontrolliert, der die Pulsbreite bestimmt.

Wenn ein passendes Speicheroszilloskop zur Verfügung steht, kann es durch einen losgelassenen Drucknopf mit einem einzigen „Schuß" getriggert werden. Andernfalls kann ein Oszillator mit niederiger Frequenz (Zehntel Hz) periodisch triggern, so dass dann jedes beliebige Oszilloskop benutzt werden kann, um die Pulse zu sehen.

Der Duty Cycle sollte unter 0.1% bleiben, um die durschnittliche Leistungsaufnahme und Verlustleisung niedrig zu halten.

3. Versorgung der Kollektoren

Wegen der großen Begrenzung der Verluste, können die Stufen einer Röhre mit mehreren Kollektoren alle verbunden warden und mit der Spannung des 1. Kollektors betrieben werden. Im Dauerbetrieb geht das natürlich nicht, da der letzte Kollektor den meisten Strom ziehen und überhitzen würde. Im Pulsbetrieb können Kolletor bzw. Kollektoren sogar mit der Helixspannung arbeiten. (Abb. 1) Es ist jedoch wünschenswert, hier einen weiteren Kondensator zu benutzen, um den Spannungsabfall an der Helix während des Pulses zu reduzieren.
Beide können aus derselben Stromversorgung gespeist werden, wenn man sie mit einem Widerstand entkoppelt.
Bei der Methode mit den wiederholten Pulsen kann dieser Widerstand so dimensioniert warden, dass der Spannungsabfall über ihm die richtigte Kollektorspannung ergibt. Bei der Ein-Puls-Methode braucht man einen echten Spannungsteiler für diesen Zweck (Hinzufügen von R2 über den Kollektorkondensator, siehe Abb. 3).
Man muss hier darauf achten, dass die Widerstände für entsprechende Lesitungen und Spannungsfestigkeit dimensioniert sind!
Die Kollektoren sind nicht besonders empfindlich hinsichtlich der anliegenden Spannung, solange diese über dem benötigten Minimalwert liegt.
Der Kollektor-Strom ist nicht direkt messbar gegen Masse. Da es sich aber um Pulse handelt, kann man ihn mit einem gut isolierten Transformator messen (Abb. 3).

4. Ladekondensatoren

Die Kapazität der Kondensatoren wird bestimmt durch den Spannungsabfall, der während des Pulses toleriert werden kann.
Die passende Formel lautet:
dU/dt = I/C bzw. C = I*dt/dU.
Beispiel : Ein Abfall von 50 V während eines Pulses von 100usbei 100mA ergibt:
C = 0.1*0.0001/50 = 2E-7 oder 200nF (0.2uF).
Die Helix braucht eine etwas konstantere Spannung, zieht aber weniger Strom als der Kollektor, so dass für beide ein ähnlicher Wert ausreicht.

5. Der Schalter

Ich benutze eine PL519 Pentode aus einer TV-Zeilenstufe. Sie ist bis 8KV gepulster Anodenspannung spezifiziert. Da die Spannung über die meiste Zeit über der Röhre anliegt (nur der Strom ist gepulst), befürchte ich, dass es irgendwann einen Überschlag geben könnte. Andererseits sind Strom und Verlustleistung in dieser Schaltung weit unter den maxmal für die Röhre zulässigen Werten. Ich benutze eine etwas größere „P"-Type, die 40V Heizspannung bei 300mA benötigt.
Mit einem 20+20V-Transformator erzeuge ich alle benötigten Spannungen (40V Heizung, +12V für die Elektronik, +200V für das zweite Gitter, -100V für das erste Gitter, siehe Abb. 4).

Eine einfache Schaltung mit zwei 555 erzeugt eine Pulsserie, mit der die PL519 (Abb. 5) angesteuert wird. Der „untere" 555 kann mit dem „freq" Potentiometer zwischen etwa 2 und 20 Hz eingestellt werden, um den Puls auf einem Nicht-Speicher-Oszilloskop darstellen zu können.
Der „untere" 555 triggert den „oberen", der als „One shot" arbeitet und die Pulsbreite beeinflusst, die mit dem „width" Potentiometer zwischen etwa 5 und 100 Mikrosekunden eingestellt werden kann. Die drei Transistoren verstärken die Pulse auf ein Level, das ausreicht um g1 und g2 von der PL519 anzusteuern.

Abb. 6 zeigt ein Foto meines Modulator-Schalter-Prototyps mit der PL519.
Relativ schnell habe ich bemerkt, dass mit g1 bei -100V und g2 bei +200 V die PL519 ab 2KV Anodenspannung mit einem „Leckstrom" reagiert.
Andererseits öffner die Röre nicht vollständig mit g1 bei 0V und g2 bei 0V. Das ist der Grund, weshalb ich die Schaltung für g2-Modulation hinzugefügt habe. Damit wird die Röhre mit g1= - 100V und g2 = 0V zum Schließen und g1=0V und g2 = +200V zum Leiten betrieben.
Evtl. könnte auch bei -200V Vorspannung an g1, mit einer festen Spannung von +200V an g2 gearbeitet werden.

6. Das Hochspannungsnetzteil

Das einzige nicht ganz triviale an der Hochspannungsversorgung für die energiespeichernden Kondesatoren ist, dass es puffern können muss, d.h. der Transformator muss gut isoliert sein. Ein geregeltes Netzteil ist schön, aber nicht unbedingt nötig. Wenn man die Hochspannung mit einem geeigneten HV-Voltmeter überwacht, ist auch eine Kombination aus Variac/Neon-Transformator und Gleichrichter verwendbar.

7. Gitter und Andoden

Normalerweise haben TWTs weitere Elektroden zwischen Kathode und Helix. Die dafür benötigten Spannungen variieren sehr stark. Zum Glück sind die benötigten Stromstärken niedrig, so dass man mit einfachen Teilern aus Widerständen arbeiten kann. Die Hersteller spezifizieren meistens, dass diese Spannungen beim Einschalten der Röhre proportional mit der Helixspannung ansteigen müssen. Wenn der Teiler wie in Abb.7 geschaltet ist, steigen die Spannungen proportional.

Der Strom durch die Widerstände fließt nur während des Pulses. Um Streukapazitäten der Drähte (Zuleitungen) und Elektroden, die die Spannungkurve in ihrer Form beeinflussen können, gering zu halten, sollte der Widerstand des Teilers relativ niedrig sein. Da der Strom nur während des kurzen Pulses fließt, ist die Leistung für die Widerstände kein Problem, solange sie die Spannung vertragen (Überschläge). Die untere Begrenzung für den Widerstand wird duch den Spannungsabfall bestimmt, den sie bei der Helix-Kondensator-Spannung während des Pulses hervorrufen.
Alternativ kann man einen kleinen Kondensator zwischen Gitter und Kathode einfügen, der den Spannungsanstieg am Gitter verzögert.
Bei einigen TWTs kann der Strahl (Beam) mit Hilfe eines einzelnen Gitters ganz an- und ausgeschaltet werden. In diesem Fall kann man sich den großen Modulator für die Helixspannung sparen und braucht nur einen kleinen Modulator für das Gitter ausbauen. Die Helixxspannung kann dann dauernd anliegen. Problematisch dabei ist, dass dieser Modulator des Gitters nahe am Kathodenpotential arbeiten muss. Evtl. könnte hier deshalb ein Puls-Transformator sinnvoll sein.

8. Anwendung

Die Heizung der TWT einschalten. Normalerweise sind dies 6.3 Volt, bei größeren Röhren bis zu einigen Ampere.
Man sollte nur mit gut isolierten Trafos arbeiten, da die volle Helixspannung zwischen Primär- und Sekundärseite anliegt!
Auch hier sollte auf unnötige Kapazitäten geachtet werden, d.h. Drähte möglichst kurz halten.
Die (vorgeschriebene) Auswärmzeit abwarten, normalerweise sind das einige Minuten.

Nun ein Oszilloskop anschließen, um wenigstens den Helixstrom beobachten zu können. Wünschenswert wäre die Beobachtung des Kollektor-Stroms auf einem weiteren Kanal / Oszilloskop.
Ich habe einen 10 Ohm Widerstand in die Kathodenleitung der PL519 eingefügt, um den Helixstrom zu messen, aber manchmal verfälscht der G2-Strom der PL519 das Bild. Deshalb ist es nötig, einen einzelnen Widerstand auf der Masseseite der Helix der TWT einzufügen, um den Helixstrom darstellen zu könne.

Nun die Hochspannung anlegen und den Modulator einschalten. Wenn man ein (digitales) Speicheroszillopskop hat, den Modulator bei kleinster Frequenz nur für einige Pulse einschalten („STOP" Schalter, Abb. 5)
Wenn die Röhre in Ordnung ist, erhält man für den Helixstrom ein Bild ähnlich der Abb. 8. Dabei sollte der volle Kollektorstrom fließen.
Die beiden „Hörner" links und rechts sind z.T. auf Streukapazitäten und z.T. auf schlechte Fokussierung während der Anstiegszeit der Spannungen zurückzuführen. Diese Hörner können einige Male höher sein, als der maximal zulässige Helixstrom. Das ist aber normal und braucht nicht weiter beachtet werden!

Der interessierende Helixstrom für CW-Betrieb kann in der Mitte der Kurve (also im Tal) abgelesen werden. Wenn die Kurve in der Mitte nicht flach ist, kann man den Puls verlängern und es noch mal versuchen.
Wenn das Oszilloskop einen geeigneten HV-Eingang hat, kann man auch die Anstiegszeiten der Spannungen kontrollieren. Sie sollten weniger als ¼ der Pulsbreite betragen.
Wenn man die TWT gleichstrommäßig abstimmt, ist das Ziel, möglichst viele Elektonen durch die Röhre zum Kollektor zu bekommen, d.h. einen möglichst niedrigen Helixstrom in der Kurvenmitte.
Möglichst viel des Kathodenstroms soll als Kollektorstrom enden, der möglichst nahe den für die Röhre spezifischen Werten kommen sollte.
Wenn die Ströme nicht so sind, wie sie sein sollten, sollte man die Spannungen variieren und ggf. Magnete am Kathoden-Ende der Röhre anbringen. Auch das Verändern der Heizspannung kann helfen.
Sobald gute Werte für die Ströme erreicht sind, kann man HF anlegen. Ein passender Koppler am Ausgang sollte etwa 10 bis 100mW Spitzenleistung ergeben und mittels Dioden-Detektor und Oszilloskop kann die Leistung überwacht werden.
Der Detektor kann mit kleiner HF Leistung in CW und DC-Kopplung am Oszilloskop geeicht werden.

9. Schlußwort

Eine relativ einfache Schaltung überwiegend mit Bauteilen aus der Bastelkiste ermöglicht die Messung verschiedener Eigenschaften von TWTs, die mit einem normalen TWT-Netzteil und Dauerbetrieb nicht gemessen werden können, bzw. die TWT geährden würde. Auch können alte oder schlechte Röhren wiederbelebt und refokussiert werden. Durch die kurzen Pulse werden thermische und HF-Last-Probleme vermieden.
Auch High-Power TWTs können problemlos getestet werden.

Locking VCXOs to 10 MHz Any Frequency – Universal Version

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Following a previous article where this circuit with a CPLD was used to implement a PLL scheme that could lock one VCXO to a 10MHz reference, this short article describes a different approach to the locking method, resulting in the possibility of locking only the least significant digits of any VCXO frequency making this circuit truly universal without need for specific configuration files as in the previous design.

Introduction

The circuit described in this article uses exactly the same hardware as the previously published reference lock circuit /1/ and consequently the same pcb and components (exception made for the resistors and capacitors forming the loop filter that should have their values adapted to this particular application).
The circuit is built around an ALTERA device EPM3064ATC44-4 that is configured to implement a low division ratio sampling PLL.
The used device, the EPM3064ATC44-4, (the -4 denotes 4 ns delay) can operate directly at above 180 MHz of clock, being the actual maximum frequency dependent on the complexity of the circuit configured inside the CPLD, that in our application sets the limit near 165 MHz, therefore being useful to lock a VCXO safely up to 150 MHz.

Circuit description

The reference signal, presumably 10 MHz (although other reference frequency could be used), is divided down to the desired comparison frequency. The reference division value can be selected externally by choosing one of the eight possible configurations. Therefore we are able to select one of the eight comparison frequencies configured. This comparison frequency is used to digitally sample the VCXO signal resulting in a down-conversion to the nearest multiple of the comparison frequency. When in the lock state the down-conversion is effectively done to DC and provides an error signal to the VCXO frequency correction.
In very practical terms this circuit appears to lock the least significant digits of the frequency of the VCXO being the most significant digits left unchanged.
For example a 96 MHz VCXO being set to 96.00 MHz +/- 5 KHz would be lock to 96.00000... MHz with as many precision digits as the actual reference signal provided to the circuit (this happens for both 10 KHz and 100 KHz lock frequency).

The reference frequency selection (hence the lock points) is done by setting the 3 configuration bits allowing up to 8 different lock points. The values configured should cover most of the needs and are presented in the table below:

-- conf = 000
locks to the nearest 10KHz multiple
-- conf = 001
locks to the nearest 100KHz multiple
-- conf = 010
locks to the nearest 2.5 KHz multiple
-- conf = 011 I
locks to the nearest 25 KHz multiple
-- conf = 100
locks to the nearest 3.3333...KHz multiple
-- conf = 101
locks to the nearest 33.33333...KHz multiple
-- conf = 110
locks to the nearest 5 KHz multiple
-- conf = 111
locks to the nearest 50 KHz multiple

Loop filter

The use of lower comparison frequencies and also extremely high gain (phase/voltage) at the phase comparison require the loop filter characteristics to be set accordingly. It can be calculated exactly to best performance and fast response however this would require to have the phase response and reference plus dividers intrinsic jitter very well characterized which would not be an easy task. The first approach can be done using the usual loop filter calculation for classical analog PLLs followed by trial and error optimization. The loop filter optimization should be done for the best compromise between speed and resulting phase noise at the VCXO. Another possibility would be to trust the inherent phase noise of the VCXO and make the loop filter several orders of magnitude slower than required. This last option will result in reduced lock range being the 010 configuration the most unfavorable.
The use of 100 KHz, 50 KHz lock points are the most favourable ones and should be used whenever possible. This allows a broader loop filter and consequently faster lock times and broader lock range.
Typical values for the R and C are:
R1=100K R2=47K C1=470nF C2=4.7uF (tantal).

Conclusion

This universal VCXO lock version presumably covers all frequency arrangement needs for the microwave and millimeter wave converters, and is therefore preferable to use over the previous version. Also, due to the low division rate in the VCXO signal path it can be beneficial to reduce even further the close in phase noise of the VCXO if an optimum loop filter is provided.

Exception should be made if the lock ranges are pretended to be large or assurance that you are locking in the correct frequency can not be done by other means, where the classical PLL version /1/ should be used, (this is however not the situation of most VCXO where the tuning range is about +/- 1KHz at 100MHz, and therefore no possibility for it to lock on the next lock point 100 KHz or 50 KHz above or below the desired frequency).
Hardcopies of the PCB's at 4:1 scale, diagrams and ready to program *.pof and *.jam files can be found at my web page:
http://w3ref.cfn.ist.utl.pt/cupido

Thanks to all that helped with ideas info and components. If after this universal version you still have specific configuration needs le me know by email: cupido@mail.ua.pt .

Reference

/1/ - Locking VCXOs to 10MHz for the Microwave and mmWave local oscillators. – L. Cupido - DUBUS 3 / 2002, p. 13

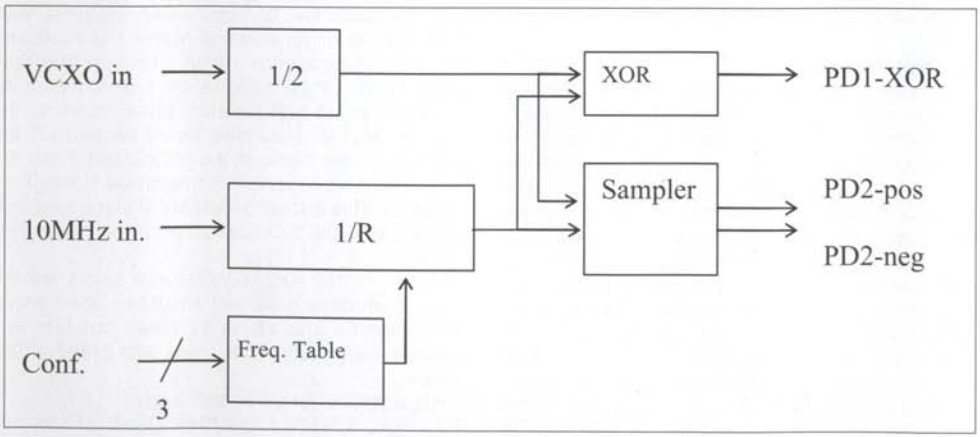
Fig 1 – Block diagram of the logic implemented inside the EPM3064.
Abb 1.: Blockdiagramm der im EPM3064 implementierten Logik.

Kopplung von VCXO`s an 10 MHz - Universelle Version für beliebige Frequenzen

In Anschluß an den Artikel im DUBUS Heft 3/2002, in dem diese Schaltung mit einem CPLD verwendet wurde, um ein PLL-Schema zu implementieren, das ein VCXO an eine 10 MHz-Referenz koppeln konnte, beschreibt dieser Artikel eine andere Methode zur Kopplung, die als Ergebnis die Möglichkeit bietet, nur die letzten entscheidenden Stellen einer beliebigen VCXO-Frequenz zu koppeln. Damit wird diese Schaltung wirklich universell, so dass keine besonderen Konfigurations-Files -wie in dem vorhergehendem Design- mehr benötigt werden.

Einleitung

Die hier beschriebene Schaltung verwendet exakt dieselbe Hardware wie die zuvor von mir beschriebene (1) Schaltung zur Kopplung von VCXOs. Damit auch dieselbe Platine und dieselben Komponenten, mit Ausnahme der Widerstände und Kondensatoren, die das Loop-Filter definieren. Diese müssen in ihren Werten an diese spezielle Schaltung angepasst werden.
Die Schaltung ist um einen EPM3064ATC44-4 von Altera herum aufgebaut, der so konfiguriert ist, eine sampelnde PLL mit niedrigem Teilungsverhältnis zu implementieren.
Der verwendete Baustein, der EPM3064ATC44-4, (die -4 steht für 4 ns Verzögerung), kann direkt bis über 180 MHz betrieben werden. Dabei wird die maximale Frequenz von der Komplexizität der Schaltung innerhalb des CPLD bestimmt. In unserem Fall ergibt sich dadurch ein Limit von etwa 165 MHz, so dass man einen VCXO sicher bis 150 MHz koppeln kann.



Schaltungsbeschreibung

Das Referenzsignal, vermutlich 10 MHz (obwohl andere Referenz-Frequenzen verwendet werden können), wird auf die benötigte Vergleichsfrequenz herunter geteilt.
Der Wert für die Referenz-Teilung kann extern aus acht möglichen Konfigurationen ausgewählt werden. Damit können wir also eine von acht konfigurierten Vergleichsfrequenzen auswählen.
Diese Vergleichsfrequenz wird verwendet, um damit das VCXO-Signal digital zu sampeln, so dass sich eine Herunterkonvertierung auf das Vielfache der Vergleichsfreuenz ergibt, das dieser am nächsten ist. Wenn die Herunterkonvertierung im gekoppelten Zustand effektiv ein DC-Signal ergibt, wird ein Fehler-Signal zur Korrektur der VCXO-Frequenz erzeugt.
Praktisch ausgedrückt scheint diese Schaltung die am wenigsten signifikanten Stellen der VCXO-Frequenz zu koppeln und die wichtigsten Stellen unbeeinflusst zu lassen.
Wird zum Beispiel ein 96 MHz VCXO auf 96.00 MHZ +/- 5 KHz eingestellt, wird eine Kopplung auf 96.00000... MHz mit so vielen genauen Stellen erreicht, wie das aktuell an der Schaltung anliegende Referenzsignal ermöglicht (dies geschieht sowohl bei 10 kHz und 100 KHz Einrastfrequenz)
Die Auswahl der Referenzfrequenzen (d.h. der Einrastpunkte) wird durch die Einstellung von drei Konfigurations-Bits ermöglicht, so dass sich bis zu acht verschiedene Einrast-Punkte ergeben. Die möglichen Werte sollten für die meisten Bedürfnisse ausreichen und sind in der folgenden Liste aufgeführt:

-- conf = 000
rastet auf das nächste 10 KHz Vielfache
-- conf = 001
rastet auf das nächste 100 KHz Vielfache
-- conf = 010
rastet auf das nächste 2.5 KHz Vielfache
-- conf = 011 I
rastet auf das nächste 25 KHz Vielfache
-- conf = 100
rastet auf das nächste 3.3333...KHz Vielfache
-- conf = 101
rastet auf das nächste 33.33333...KHz Vielf.
-- conf = 110
rastet auf das nächste 5 KHz Vielfache
-- conf = 111
rastet auf das nächste 50 KHz Vielfache

Das Loop-Filter

Die Verwendung von niedrigeren Vergleichsfrequenzen und sehr hoher Verstärkung (Phase/Spannung) beim Phasenvergleich erfordern eine Anpassung der Eigenschaften des Loop-Filters. Es kann exakt für beste Performance und Geschwindigkeit berechnet werden. Allerdings braucht man dann genaue Angaben über die Phasen-Antwort und -Referenz und auch über den intinsischen Jitter der Teiler. Dies ist nicht ganz einfach.
Ein erster Ansatz kann die Verwendung einer Berechnung eines normalen Loop-Filters für eine klassische PLL sein, das man dann nach der Methode „Versuch und Irrtum" weiter optimiert.
Das Loop-Filter sollte auf den besten Kompromiss zwischen Geschwindigkeit und resultieredem Phasenrauschen am VCXO optimiert werden.
Eine andere Möglichkeit wäre, dem Eigen-Phasenrauschen des VXCO zu vertrauen und das Loop-Filter um einige Größenordnungen langsamer als benötigt zu dimensionieren. Diese Variante resultiert in einem reduzierten Einrast-Bereich, wobei die 010 Konfiguration am ungünstigsten wird.
Die Verwendung der 100 KHz und 50 KHz - Rastpunkte sollte favorisiert werden, d.h. diese sollten wenn immer möglich benutzt werden. Dies ermöglicht ein breiteres Loop-Filter und damit schnellere Einrastzeiten und einen breiteren Einrastbereich.
Typische Werte für die Rs und Cs sind:
R1=100K R2=47K C1=470nF C2=4.7uF (Tantal).

Zusammenfassung

Diese Version der universellen VCXO-Kopplung deckt vermutlich alle Bedürfnisse an Frequenzeinstellungen bei Konvertern für Mikrowellen und Milimeterwellen ab und dürfte damit der zuvor vorgestellten Version vorzuziehen sein.
Auch kann es aufgrund der niedrigen Teilungsrate im Signalpfad des VCXO nützlich sein, das Einbrechen des Phasenrauschens des VCXO weiter zu reduzieren, wenn ein optimales Loop-Filter vorhanden ist. Ausnahmen sollten gemacht werden, wenn weite Einrastbereiche vorgegeben sind, oder wenn es keine anderen Mittel zur Absicherung gibt, dass man auf der richtigen Frequenz einrastet. Dann also sollte die klassische PLL-Version (1) verwendet werden. (Dies ist aber bei den meisten VCXOs nicht gegeben, bei denen der Abstimmbereich bei +/- 1 KHz auf 100 MHz liegt, und somit hier keine Möglichkeit besteht, auf den nächsten Einrastpunkt 100 kHz oder 50 KHz oberhalb oder unterhalb der benötigten Frequenz einzurasten.)
Layouts der Platine im Maßstab 4:1, Diagramme und fertige *.pof und *.jam - Files zum Programmieren kann man auf meiner Internetseite finden unter: http://w3ref.cfn.ist.utl.pt/cupido

Mein Dank geht an alle, die mir mit Ideen, Informationen und Komponenten geholfen haben.
Falls jemand bei dieser universellen Version dennoch spezielle Konfigurationswünsche haben sollte, kann er sich per email an mich wenden.

Locking VCXOs to a GPS 1 pps Output (for the Microwave and mmWave Local Oscillators)

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Following previous articles where phase locking of VCXOs to a 10MHz stable reference were described, this article presents an implementation using the same hardware configured to lock to the 1pps output of a GPS receiver. The circuit can be used to assure stability to microwave and millimeter-wave transverters without the need to maintain a high stability 10MHz reference, or simply to stabilize a 10MHz VCXO thus providing a secondary standard.

Introduction

The circuit described in this article uses exactly the same hardware as the previously published reference lock circuit /1/ and universal phase lock /2/ and consequently the same pcb and components, exception made for the resistors and capacitors forming the loop filter that should have their values adapted to this particular application and the coupling capacitors shortened on the reference input path to allow the 1pps signal (TTL/CMOS) to pass through.

The circuit is built around an ALTERA device EPM3064ATC44-4 that is configured to implement a time lag phase comparator with PWM DAC output.

The device employed the EPM3064ATC44-4, (the -4 denotes 4 ns delay) can operate directly at above 180MHz of clock, being the actual maximum frequency dependent on the complexity of the circuit configured inside the CPLD. For this application nearly all resources of the CPLD were used being the actual limit around 150MHz therefore being useful to lock a VCXO safely up to 145MHz.

Circuit description

The circuit implements a phase comparator (phase/time lag counting method) and a PWM dac to output the result of the phase comparison. The phase comparison method consists in measuring the time lag between edges of the 1pps signal and the scaled version of the signal to be locked. The VCXO signal is divided by a predefined value (set by the configuration input bits) to produce the required down scaled version of the VCXO. In this application is the VCXO that signal is used to clock most of the internal circuitry as the true reference signal. The 1pps is too slow for that purpose.

At every 1pps pulse the time lag value is latched providing a stable value throughout the entire 1 second period. This time lag value is continuously output to a 1 bit DAC using PWM.

Lock points

As the reference for the time lag measurement is the 1pps signal, the time elapsed from the 1pps to the other signal will be constant whenever this signal is an exact multiple of 1Hz. This results in a similar scheme as in the universal lock version described in a previous article /2/. The time lag increases if this frequency becomes lower than the exact 1Hz multiple and decreases if the frequency becomes higher. The lock point becomes therefore the closest 1Hz multiple. Therefore the actual lock points become 1Hz multiplied by the VCXO division ratio set by the configuration table. The VCXO divider can be set to accommodate the convenient locking frequency least significant digits, however the values to be used must obey a criteria that ensures the time lag counter to reach the maximum dac value in order not to compromise the lock range. The internal sequencer uses a 2 bit counter that clocks the time lag counter at ¼ of the VCXO frequency so the main divider should provide a division by about 4 times the maximum time lag counter maximum in order to use the total DAC range. The lock points configured are presented in the table below, The values chosen should be suitable for most of the microwave local oscillator's VCXO.

-- conf = 00 locks to 4KHz multiples, best lock range, 10/100/96/90MHz etc.

-- conf = 01 locks to 3 KHz multiples, 75% dac range

-- conf = 10 locks to 2.5KHz multiples, 60% dac range

-- conf = 11 locks to 2 KHz multiples, 50% dac range, worst case.

Loop filter

The 1 Hz rate of change of the PWM-DAC suggests immediately that we must filter orders of magnitudes lower for correct averaging and insensitivity to the 1pps signal jitter. This is absolutely right however we may be quite satisfied with the

low jitter of the 1pps that we can get from modern GPS cores and therefore only need to average the PWM frequency into a reasonably clean DC signal. The original values for the loop filter are enough to remove most of the PWM noise and can be used in this situation. If some degree of averaging is however required you can simply scale both capacitors proportionally. Typical loop filter's R and C values to achieve some degree of averaging are: R1=100K R2=47K C1=1uF (stack two smd 470nF capacitors) C2=10uF(tantal).

References

/1/ - Locking VCXOs to 10MHz for the Microwave and mmWave local oscillators. – L. Cupido - DUBUS 3 / 2002, p. 13
/2/ - Locking VCXOs to 10MHz, Universal Version - http://w3ref.cfn.ist.utl.pt/cupido
and – L. Cupido - DUBUS 1 / 2003

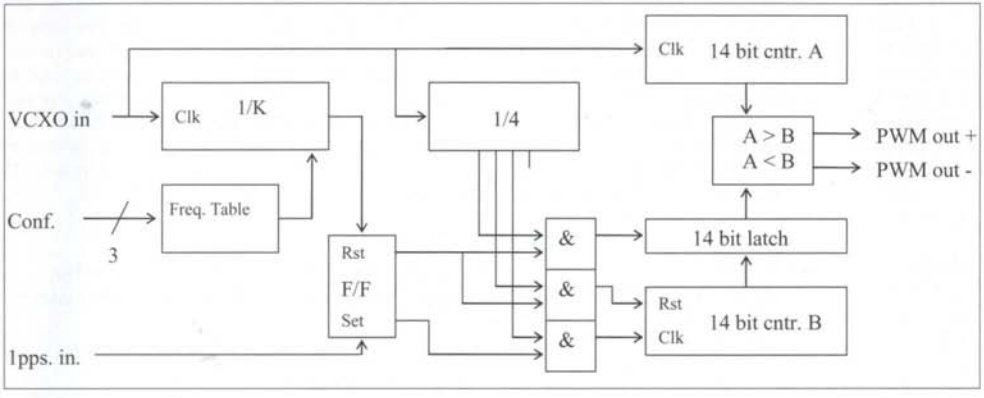

Fig. 1 – Block diagram of the logic implemented inside the EPM3064.
Abb. 1: Blockdiagramm der im EPM3064 implementierten Logik.

Hardware changes

The 1pps signal has already digital levels, presumably CMOS or TTL compatible, but it may be a good idea to buffer this before delivering it to the CPLD. The conditioning amplifier made using the two 74F04 inverters is no longer necessary for this 1pps version, furthermore it is undesirable. The best way to solve this with minimal effort is to replace C3 and C4 by short circuits and not install R6 and R7.
Also, as described previously, the loop filter must be set according to the rate of change of the PWM output signal and the VCXO tuning characteristics. No other hardware changes are necessary.

Conclusion

Locking to 1pps gives you the ultimate accuracy with full mobility. The circuit can be also used at home to make a secondary 10MHz standard.
Hardcopies of the PCB's at 4:1 scale, diagrams and ready to program *.pof files can be found at my web page: http://w3ref.cfn.ist.utl.pt/cupido Thanks to all for the support I received for these developments. This 1pps version has some limitations regarding the possible lock point table changes. However, if you have any specific configuration need let me know by email cupido@mail.ua.pt and I will check if it fits inside the CPLD device.

Kopplung von VCXOs an einen 1 pps GPS-Ausgang (für Mikrowellen und mm-Wellen LO´s)

Im Anschluß an die Artikel, in denen die Kopplung von VCXOs an eine stabile 10 MHz Referenz beschrieben wurde, wird hier eine Implementierung präsentiert, die dieselbe Hardware benutzt und an den 1 pps Ausgang eines GPS-Epmfängers koppelt. Diese Schaltung kann benutzt werden, um Mikrowellen- und Millimeterwellen-Transverten die nötige Stabilität zu verleihen, ohne eine hochstabile 10 MHz-Referenz zu benötigen oder, um einfach einen 10 MHz VCXO mit einem sekundären Standard zu stabilisieren.

Einleitung

Die hier beschriebene Schaltung verwendet exakt dieselbe Hardware wie die zuvor von mir be-

schriebene (1) Schaltung zur Kopplung von VCXOs und die universelle Kopplungsschaltung (2). Damit auch dieselbe Platine und dieselben Komponenten, mit Ausnahme der Widerstände und Kondensatoren, die das Loop-Filter definieren. Diese müssen in ihren Werten an diese spezielle Schaltung angepasst werden. Ausserdem müssen die Koppelkondensatoren im Eingang verkleinert werden, damit das 1pps Signal (TTL/CMOS) durchgelassen wird.
Die Schaltung ist um einen EPM3064ATC44-4 von Altera herum aufgebaut, der so konfiguriert ist, einen zeitverzögernden Phasenkomparator mit einem PWM DAC Output zu implementieren.
Der verwendete Baustein, der EPM3064ATC44-4, (die -4 steht für 4 ns Verzögerung), kann direkt bis über 180 MHz betrieben werden. Dabei wird die maximale Frequenz von der Komplexizität der Schaltung innerhalb des CPLD bestimmt. In unserem Fall ergibt sich dadurch ein Limit von etwa 150 MHz, so dass man einen VCXO sicher bis 145 MHz koppeln kann.

Schaltungsbeschreibung

Die Schaltung implementiert einen Phasenkomparator (Methode der Zählung der Phase/Zeitverzögerung) und einen PWM DAC als Ausgang für das Ergebnis des Phasenvergleichs.
Die Methode des Phasenkomparators besteht in der Messung des Zeitunterschieds zwischen den Flanken des 1pps-Signals und der heruntergeteilten Version des zu rastenden Signals.

Das VCXO-Signal wird durch einen vorher definierten Wert geteilt (bestimmt durch die bits der Eingangskonfiguration), um das benötigte heruntergeteilte VCXO-Signal zu erhalten.
In dieser Applikation ist das VCXO-Signal dasjenige Signal, dass den größten Teil der internen Schaltung als echtes Referenzsignal taktet, da das 1pps-Signal hierfür zu langsam wäre.
Bei jedem 1pps-Impuls wird der Wert für die Zeitdifferenz festgehalten, so dass ein sabiler Wert über eine Periode von einer ganzen Sekunde erhalten wird.
Dieser Wert der Zeitdifferenz wird fortwährend auf einen 1 bit DAC mit PWM ausgegeben.

Einrastpunkte

Da die Referenz für die Messung der Zeitdifferenz das 1pps-Signal ist, ist die verstrichene Zeit vom 1pps-Signal zum anderen Signal konstant, sobald dieses Signal ein exaktes Vielfaches von 1 Hz ist.
Dies resultiert in einem ähnlichen Schema wie bei der universellen Version (2). Die Zeitdifferenz vergrößert sich, wenn diese Frequenz kleiner wird als das exakte Vielfache von 1 Hz und sie verkleinert sich, wenn die Frequenz höher wird. Der Einrastpunkt wird deshalb das am nächsten liegende 1 Hz-Vielfache. D.h. die aktuellen Einrastpunkte sind 1 Hz multipliziert mit dem VCXO-Teilungsverhältnis, das durch die Konfigurationstabelle bestimmt wird.
Der VCXO-Teiler kann für günstige Rastfrequenz bei am wenigsten signifikanten Digits eingestellt werden. Allerdings müssen die verwendeten Werte einem Kriterium folgen, das sicherstellt, dass der Zeitdifferenz-Zähler den maximalen DAC-Wert erreicht, um nicht den Einrastbereich zu beeinträchtigen.
Der interne Sequenzer verwendet einen 2 bit Zähler, der den Zähler der Zeitdifferenz mit ¼ der VCXO-Frequenz taktet, so dass der Hauptteiler eine Teilung von etwa dem 4-fachen des Maximums des Zeitdifferenzzählers bewirken sollte, damit der ganze DAC-Bereich verwendet werden kann. Die konfigurierten Einrastpunkte findet man in der beigefügten Tabelle. Die dort aufgeführten Werte sollten für die meisten Mikrowellen-LO VXCOs ausreichend sein.

-- conf = 00 rastet auf 4 KHz Vielfache, bester Rastbereich, 10/100/96/90MHz etc.

-- conf = 01 rastet auf 3 KHz Vielfache, 75% dac-Bereich

-- conf = 10 rastet auf 2.5KHz Vielfache, 60% dac-Bereich

-- conf = 11 rastet auf 2 KHz Vielfache, 50% dac-Bereich, schlechtester Fall.

Loop Filter

Die 1 Hz Rate beim PWM-DAC läßt sofort erwarten, dass wir um Größenordnungen tiefer filtern müssen, um korrektes Berechnen und Unempfindlichkeit gegen den Jitter des 1pps-Signals zu erreichen.
Das ist auch ganz richtig, aber wir können mit dem niedrigen Jitter des 1pps-Signals moderner GPS-Geräte zufrieden sein, so dass lediglich die PWM-Frequenz in ein angemessen sauberes DC-Signal gerechnet werden muss.
Die bestehenden Werte für das Loop-Filter reichen aus, um den größten Teil des PWM-Rauschens zu entfernen und können übernommen werden. Wird jedoch ein bestimmtes Maß an Averaging benötigt, kann man einfach die beiden Kondensatoren proportional bemessen.
Typische Werte für die Rs und Cs im Loop-Filter, um ein gewisses Maß an Averaging zu erhalten sind:
R1=100K R2=47K C1=1uF (2 x 470nF SMD Kondensator) C2=10uF (Tantal).

Hardware Änderungen

Das 1pps-Signal hat bereits digitalen Charakter, vermutlich CMOS oder TTL kompatibel; evtl. ist es eine gute Idee, dieses noch vor Erreichen der CPLD zu buffern,

Für die 1pps-Version ist der Verstärker mit den zwei 74F04 nicht länger nötig, bzw. unerwünscht. Um dies mit minimalem Aufwand zu ändern, kann man C3 und C4 durch Brücken ersetzen und R6 und R7 weglassen.

Ebenfalls muß – wie oben beschrieben – das Loop-Filter entsprechend der Frequenz des PWM Ausgangssignals und der Abstimmcharakteristik des VCXO angepasst werden. Weitere Änderungen der Hardware sind nicht nötig.

Schluß

Kopplung an 1pps ermöglicht die ultimative Genauigkeit bei voller Mobilität.

Die Schaltung kann auch stationär verwendet werden, um einen sekundären 10 MHz-Standard zu realisieren.

Layouts der Platine im Maßstab 4:1, Diagramme und fertige *.pof - Files zum Programmieren kann man auf meiner Internetseite finden unter: http://w3ref.cfn.ist.utl.pt/cupido

Danke für die Unterstützung, die ich bei diesen Entwicklungen erhalten habe.

Die 1pps-Version hat einige Begrenzungen hinsichtlich der Möglichkeiten die Tabelle mit den Einrastpunkten zu verändern.

Falls jemand dennoch spezielle Konfigurationswünsche haben sollte, kann er sich per email an mich wenden und ich werde prüfen, ob man dies mit der CPLD verwirklichen kann.

Sources / Bezugsquellen

Several readers have asked for sources where to obtain the parts that were presented in the Microwave Parts column in the last DUBUS issues.
Here we have some information.

Mehrere Leser haben angefragt, wo man die in den letzten DUBUS Ausgaben in der Microwave Parts Rubrik vorgestellten Bauteile erhalten kann.
Hier einige Informationen hierzu.

Parts from **Watkin Johnson** can be obtained from:
Bauteile von Watkin Johnson können bezogen warden von:
Fa. Richardson Electronics, Zeppelinstr. 2
D-82178 Puchheim.
Ansprechnpartner: Herr Guenter Hoffmann
Tel: 036781/37090 Fax: 036781/37099
E-Mail (guenter@rell.com) Internet: www.rell.com

Bauteile von **RFMD** (RFMD2360) können bezogen werden von: Parts from RFMD can be obtained from: municom GmbH, Fuchsgrube 4
D-83278 Traunstein Telefon: 0861/16677-0
Fax: 0861/16677-88 Internet: www.municom.de

Die Bauteile der Fa. **Linear Technology** können bezogen werden bei:
Parts from Linear Technology are available from:

www.linear.com
Fax: ++49 89 963147
or from Setron, www.setron.de

The 2002 YM3XC Crew in KN30 (Turkey):
From the left: TA1E, TA1CGI, HB9DUR

YM3XC, KN30FC, Shack, Nov. 2002
See report on page 84

Analysis of The OK1DFC Septum Feed

Paul Wade, W1GHZ
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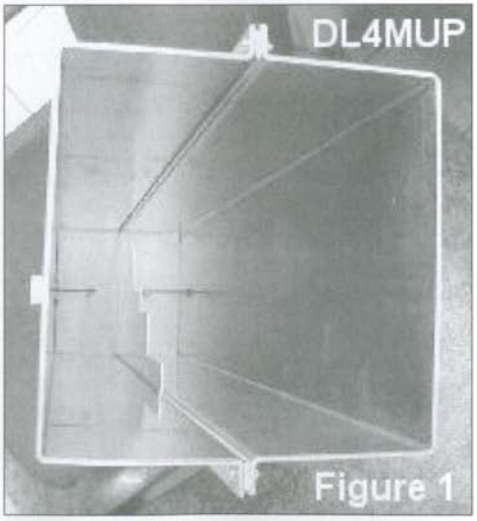
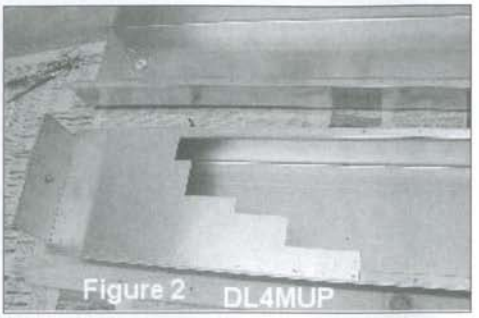
The septum feed[1] was described by Zdenek, OK1DFC, at the 10th International EME Conference 2002 in Prague. On-the-air results were promising, but, like any new antenna, there were questions as to how well it really works. Computer simulations suggest that this feed should work well, and also suggest some variations to allow use over a range of dish f/D. The septum polarizer may also be used to generate circular polarization in other feedhorns.

Description



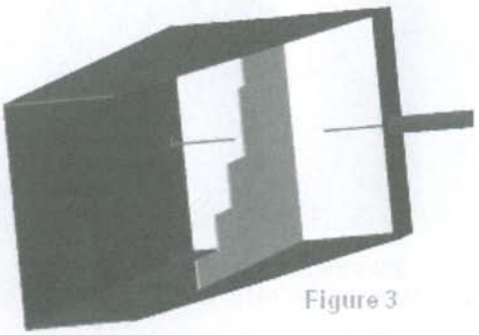
The septum feed as described by OK1DFC is an unflared square horn, or simply a square waveguide, with a thin internal stepped septum to generate circular polarization. Figure 1 is the view looking into the horn,Figure 2 is a photo of a partially assembled feed with the septum in place, and Figure 3 is a cartoon of a septum feed with one wall cut away to show the internal septum. The horn is excited by inputs on either side of the septum, with the two sides exciting opposite senses of circular polarization, one right-hand circular polarization and the other left-hand. For



EME, this provides separate transmit and receive ports of opposite polarization. The excitation may come from two rectangular waveguides, each matching the dimensions of one-half of the square horn, or from a perpendicular probe on each side of the septum acting as an integral transition from coax to the waveguide. The two methods should provide identical results provided that the waveguide section before the septum is long enough to suppress any spurious modes.

The radiating element, at the aperture, is simply a square horn. Rotated 45 degrees, it is identical to a diagonal horn[2]; if the diagonal horn is excited with circular polarization, then the radiated pattern should be identical. N7ART has shown[3] the diagonal horn to be a good feed, so we might expect the septum feed to be also. The version described by N7ART used phased crossed dipoles to generate circular polarization, an arrangement that seems awkward at higher frequencies. The septum could be a better way to generate circular polarization.

The septum is a bit more complicated. A circularly polarized wave entering the aperture may be considered to have two polarization components with a 90° phase difference, one parallel to the septum and one perpendicular. The parallel component is divided equally by the septum and passes to the two rectangular input waveguides. The cutoff frequency for the perpendicular component is changed by the septum, so that the wavelength for



the perpendicular component is shorter. Thus, the electrical length of the septum is longer for the perpendicular component than for the parallel component; if the difference in length is ¼ λ, or 90°, then the horizontal and vertical components arrive in phase at the input. The components add together on one side and cancel on the other, depending on the sense of circular polarization, so that the two ports are isolated from each other. In order to achieve the difference in electrical lengths in a reasonable physical distance, the septum polarizer operates near the cutoff wavelength of the waveguides.

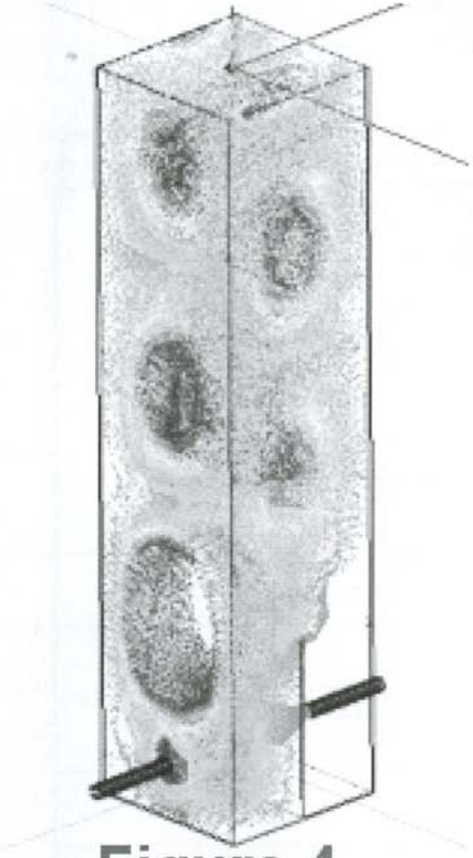


Figure 4

Figure 4 shows the computer-simulated E-field distribution inside a septum feed, with the polarization component perpendicular to the septum visible through the left wall (with the probe) and the component parallel to the septum visible through the top wall (between the probes). The red areas of high field intensity are separated by ½ λ_g along each wall, so we can see that the top and side are ¼ λ apart at the aperture end, but go through a more complex difference around the steps in the septum. The cancellation at the input probe on the far side is also clear.

The first septum polarizers[4] used a sloping septum, with a linear taper around 30°, like the cartoon cutaway in Figure 5. This version apparently[5] offered limited bandwidth and isolation, so the stepped septum[6] was developed to improve isolation and bandwidth. All the references state that the field solution around the septum is very difficult so no analytic procedure is available. However, Chen & Tsandoulas[6] show an example with dimensions, which OK1DFC has converted to a spreadsheet that calculates dimensions for other frequencies by scaling the dimensions. Since the example is for a 0.635λ square horn, and we don't know how to calculate septum dimensions for other horn sizes, we are limited to this size horn for the septum section. It should work equally well at all frequencies as long as all dimensions are scaled.

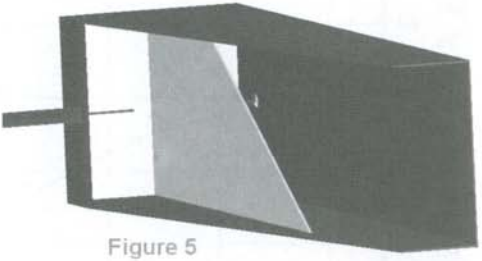


Figure 5

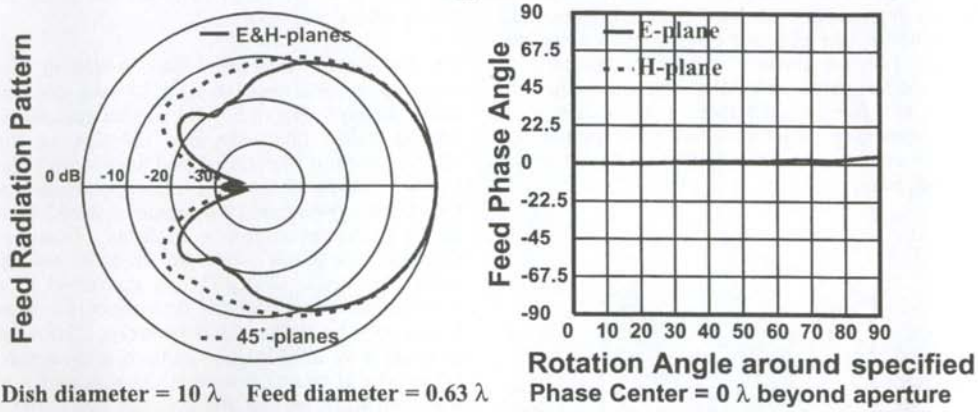
Simulations

A septum feed for 1296 MHz with dimensions specified by OK1DFC was simulated using Ansoft **HFSS** software[7]. The calculated radiation patterns in Figure 6 show the broad illumination expected of a small horn. Like other open waveguide feeds, the rear lobes are relatively large, only about 12 dB down, reducing the calculated efficiency to about 68% with best ***f*/D** around 0.35 to 0.4. Patterns for right-hand and left-hand circular polarization are pretty much identical. Patterns were calculated for both probe excitation and rectangular waveguide excitation; they were very similar, so the distance from the probe to the septum is adequate.

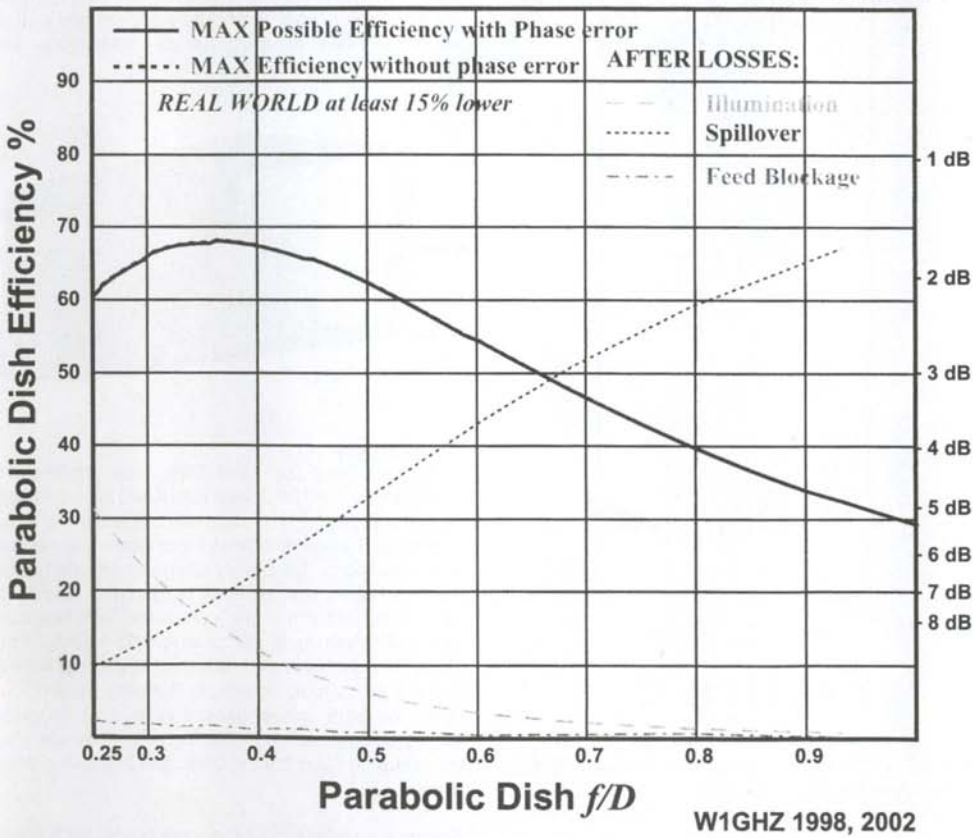
Previous simulations of diagonal feeds[8] with linear polarization showed good radiation patterns, but

OK1DFC Septum feed for 1296, 0.63λ square, RHCP

Figure 6



Dish diameter = 10 λ Feed diameter = 0.63 λ



W1GHZ 1998, 2002

also had with efficiency reduced by the large rear sidelobes typical of open waveguide feeds. Square horns[9], with linear polarization parallel to the sides, show larger sidelobes in the E-plane. Since the circular polarization vector is constantly rotating between these two conditions, we might expect the radiation pattern to be a composite of a diagonal horn and a square horn. The circularly polarized pattern of the septum feed, shown in 3D in Figure 7, looks like we might imagine this composite, showing sidelobes on the four corners like the diagonal horn, generated as the polarization vector passes through horizontal and vertical polarization in the square horn. The sidelobes on the corners reduce the calculated efficiency by perhaps four percentage points compared to a calculation using only the traditional horizontal and vertical pattern cuts.

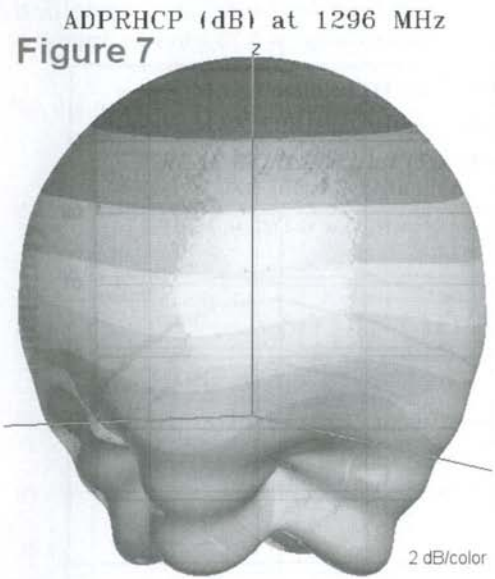


Figure 7

The circular polarization is quite good, with a polarization ratio (the ratio of the desired polarization sense to the opposite sense) of about 21 dB, and the pattern circularity is good. Isolation between the two ports is about 24 dB at 1296 MHz, with reasonable bandwidth, showing good isolation from at least 1.2 to 1.4 GHz. This high isolation means that the receive port does not affect the transmit pattern and vice-versa. Note that reflection from the parabolic reflector reverses the circular polarization, so that the reflection coming back into the horn will reduce the isolation.

While the calculated efficiency of this feed is not as high as some, the better ones have a larger blockage shadow, so the septum feed may be the best performer on a small dish where circular polarization is required.

Simulation of the version with a simple 30° tapered septum showed very similar performance at 1296 MHz, but the isolation between ports was high over a smaller bandwidth, roughly 100 MHz. This is quite adequate for amateur use, and the sloping septum might be easier to fabricate at higher frequencies.

Other *f*/D dishes

The diagonal horn may be tailored to illuminate a various ***f*/D** by varying the dimensions of the diagonal section, or by adding a flared section for larger ***f*/D**. Since the operation of the septum in generating circular polarization depends on the guide dimensions being close to the cutoff wavelength, the square cross-section is fixed at 0.63λ for a given operating frequency. However, a flare section may be added to increase the aperture size to optimize the horn for any larger ***f*/D**, so that the septum feed may be used for any dish with ***f*/D** > 0.3. Since there are no good feeds for very deep dishes, the septum feed is probably as good as any for deeper dishes.

The flare section is similar to a rectangular waveguide horn, except that it should maintain a square cross-section. Rectangular horns need different aperture dimensions in the E- and H- planes to achieve the same beamwidth, but the circular polarization of the septum feed has no fixed planes – they are constantly rotating in a circle - so the symmetry of the square cross-section should be maintained. The flare should have a gentle taper, like the cutaway cartoon in Figure 8.

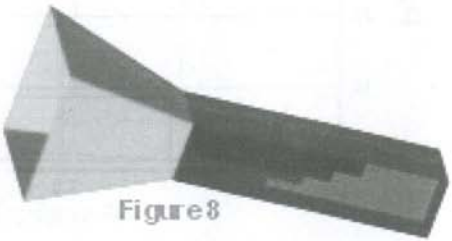
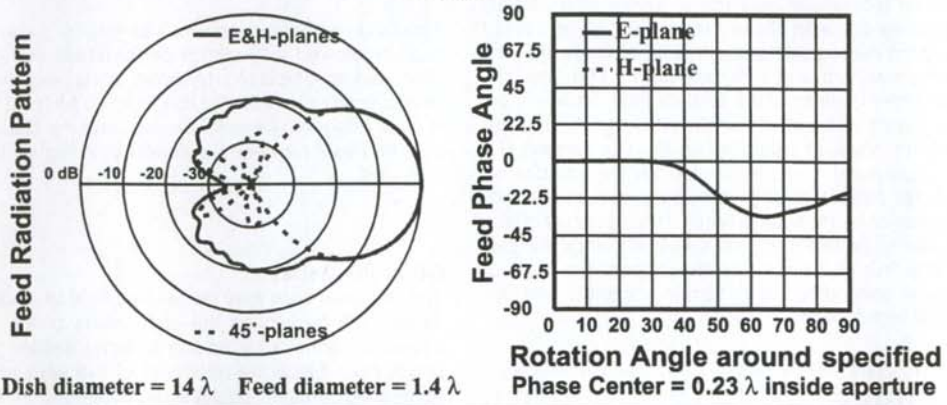


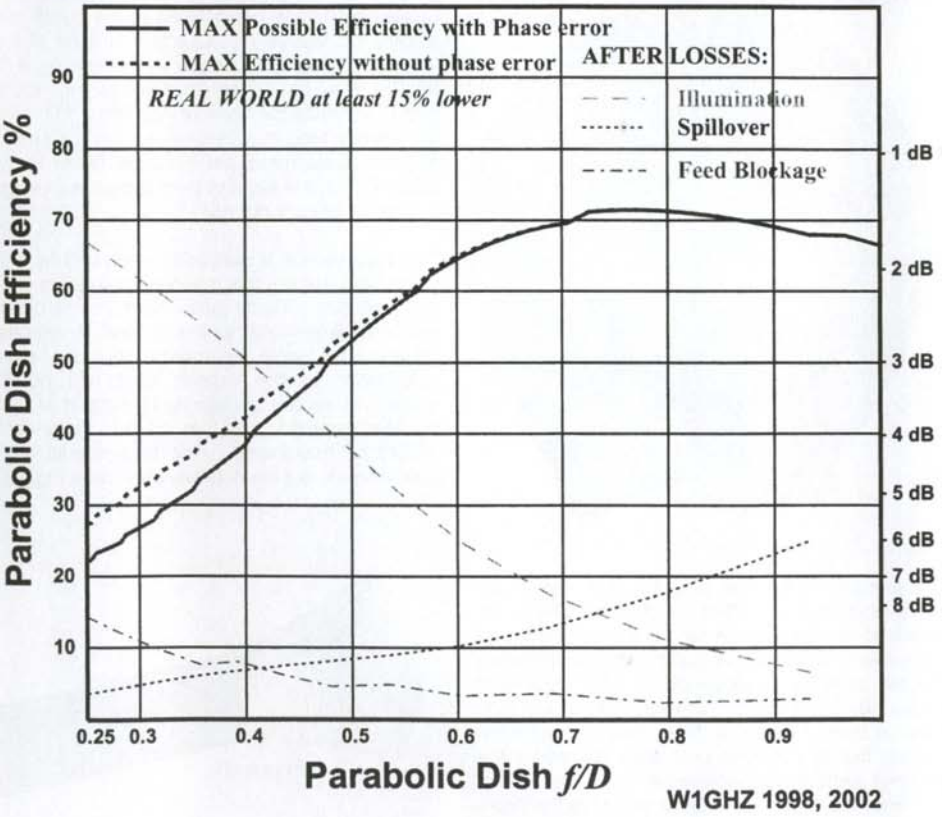
Figure 8

OK1DFC Septum feed with flare to 1.4λ square at 1296, RHCP

Figure 9



Dish diameter = 14 λ Feed diameter = 1.4 λ



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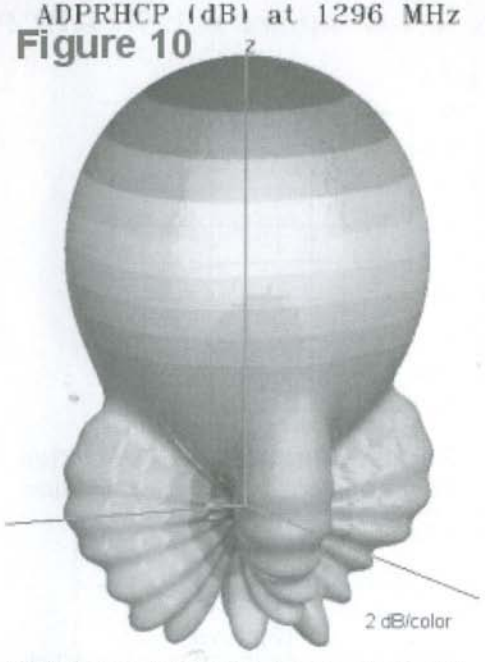
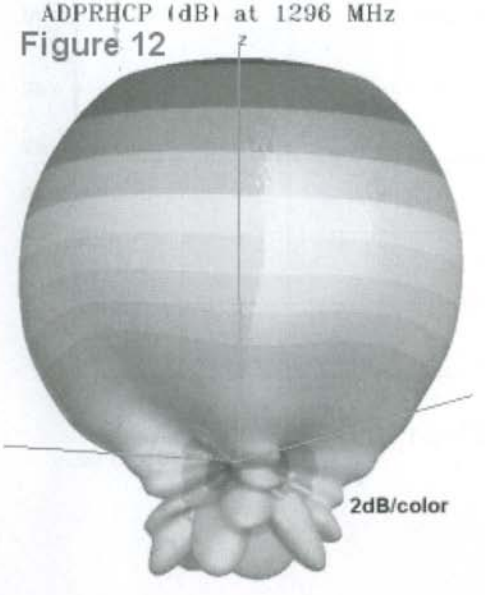


I first tried a adding a flare section with an aperture 1.4λ square and a flare angle of 30° (15° halfangle on each side of the septum), since this size diagonal horn with linear polarization is a good feed for an offset dish with an equivalent ***f*/D** around 0.7.

With the septum feed generating circular polarization, the calculated efficiency in Figure 9 is high with best ***f*/D** is around 0.7 to 0.85, suitable for many offset dishes. This horn also had high rear sidelobes on the corners, so that the 3D pattern in Figure 10 looks like a rocket with fins. Making the flare section octagonal to eliminate the corners reduces the rear sidelobes and increases efficiency slightly.

An intermediate size flare, with an aperture 1.1λ square, produces the radiation patterns in Figure 11 with high calculated efficiency at intermediate ***f*/D**, best around 0.5 to 0.6. The corner lobes for this horn are less pronounced in the 3D pattern, Figure 12.

Both flared septum horns show good isolation and cross-polarization. Since horn beamwidth is inversely related to aperture size, we can choose an appropriate aperture for the flare for any ***f*/D** by interpolating between the results for the three sizes above, 0.63λ square, 1.1λ square, and 1.4λ square. For smaller apertures, the flare angle should be small so that the flare length is reasonably long.



Chokes

The VE4MA feed[10] adds a choke ring around a circular waveguide feed to reduce side and back lobes, thus increasing feed efficiency by putting more of the energy on the reflector. Since the unflared septum feed has rather large rear lobes, perhaps a choke would improve the septum feed also; the cartoon in Figure 13 shows one with a circular choke and one wall cut away to reveal the septum. Adding a circular choke with the same dimensions as the VE4MA feed, 419 mm in diameter and 121 mm deep at 1296 MHz, resulted in a significant reduction in the back lobes, as shown in Figure14. Calculated efficiency improved to 72% with best ***f*/D** between 0.33 and 0.43. The 3D pattern, Figure 15, shows that the round choke eliminates the corner lobes.

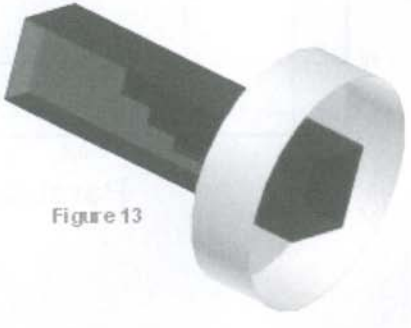
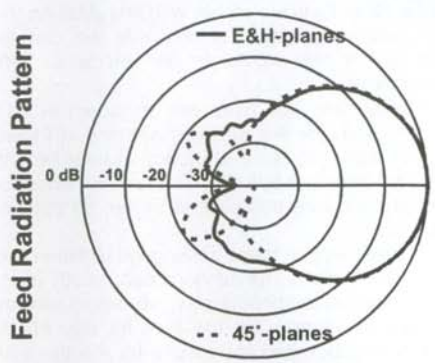
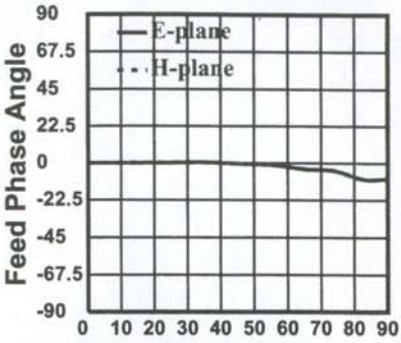


Figure 13

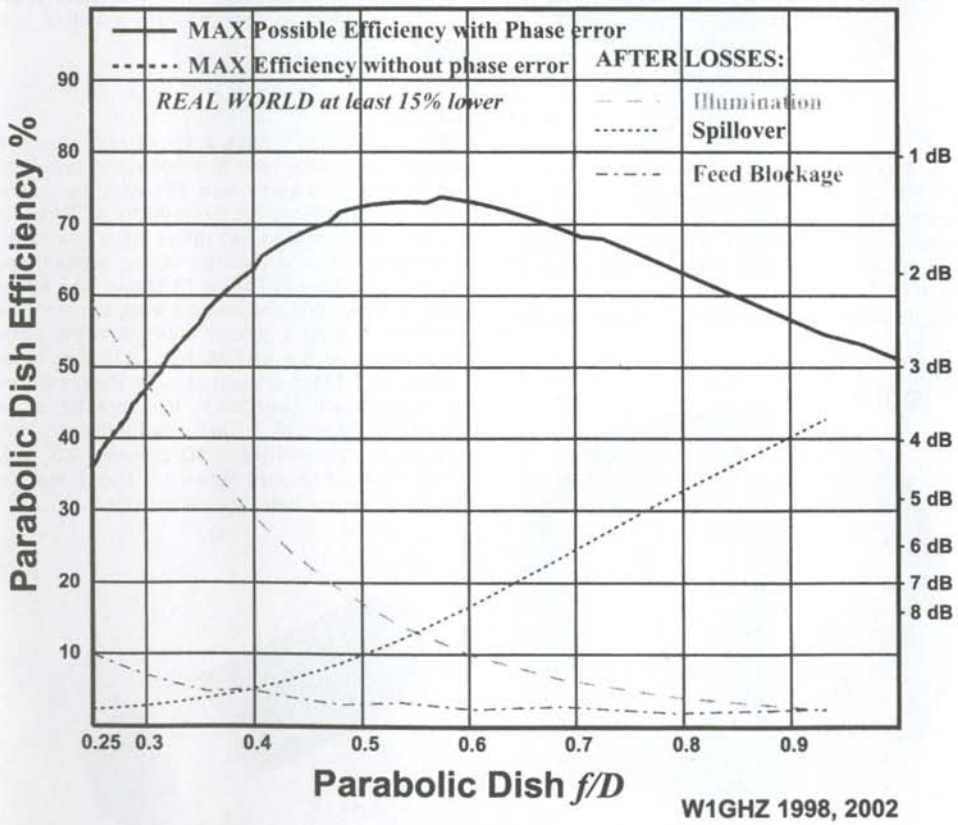
OK1DFC Septum feed with flare to 1.1λ square at 1296, RHCP

Figure 11





Dish diameter = 11 λ Feed diameter = 1.1 λ



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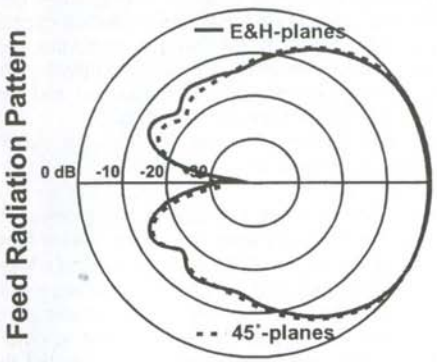
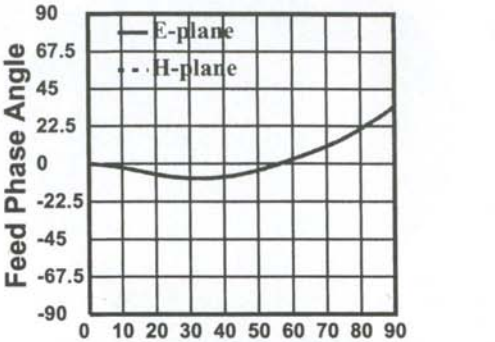
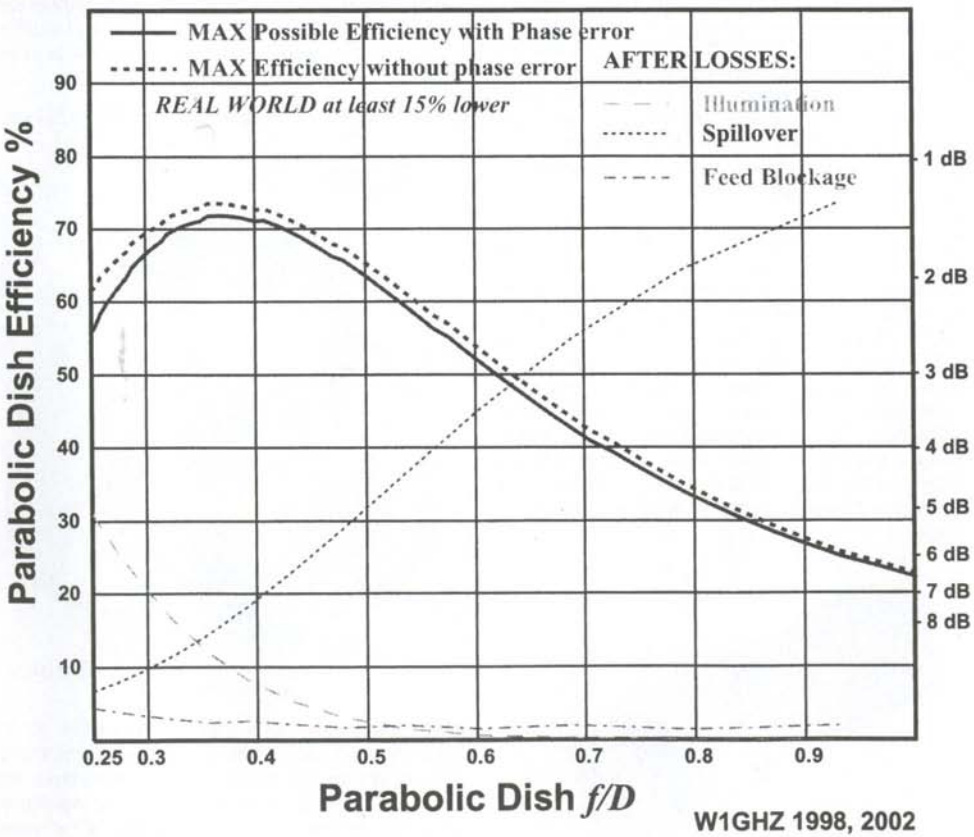
Septum feed with 1.8λ dia round choke, LHCP at 1296 MHz

Figure 14





Dish diameter = 18 λ Feed diameter = 1.8 λ



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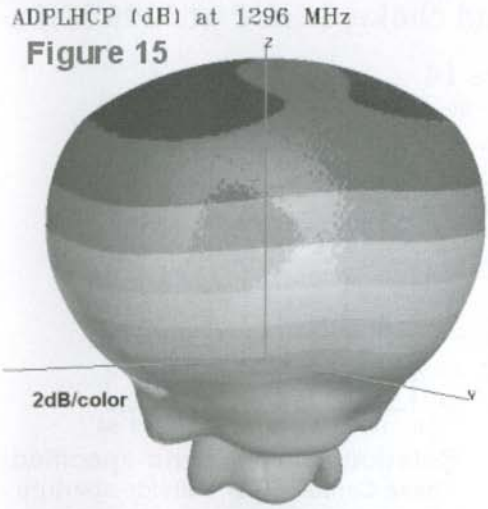
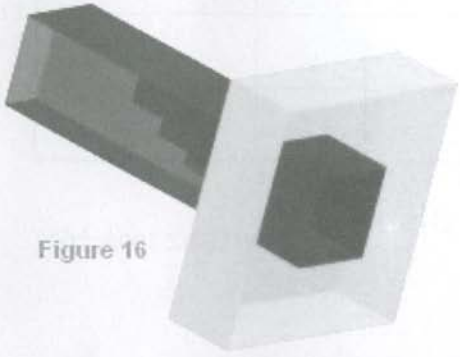


Isolation between the ports is still good, but the polarization ratio is slightly lower, with the undesired polarization sense only about 19 dB down. However, the increased efficiency comes at a price: the blockage shadow has increased from 0.63λ square to 1.8λ diameter, a significant difference for a small dish.

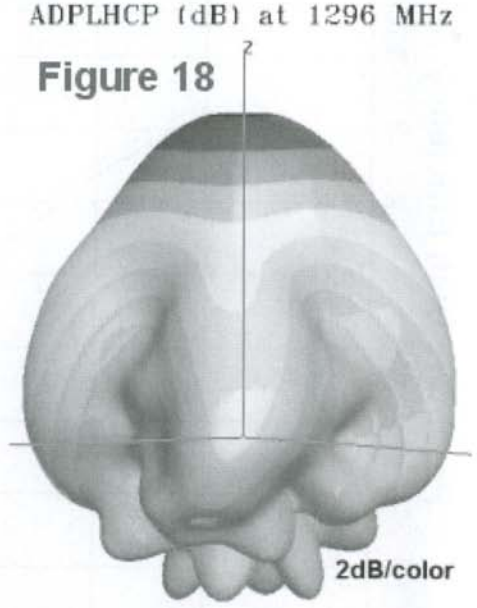
Since the septum feed may be fabricated by cutting and bending sheet metal, it seemed that a square choke like the cartoon in Figure 16 might be easier to fabricate than a round one. From the round choke, I estimated choke dimensions of 1.7λ square and the same 121 mm deep. As shown in Figure 17, the square choke does not work nearly as well as the round one, with lower efficiency and a 3D pattern, in Figure 18, resembling a pepper. I don't know whether it is the shape or the dimensions that reduce the performance, but I'd recommend sticking with the round choke.



VE4MA feed with septum polarizer

The septum polarizer seems to do a good job of producing circular polarization in a square cross-section, with no adjustment required. Would a septum polarizer work in circular waveguide? One reference[11] described a stepped septum in circular waveguide, talked about using a computer program to solve the wave equation, and plotted the relative cutoff wavelengths of the parallel and perpendicular components vs. step height.
Then they said the lengths are adjusted experimentally to achieve 90° phase shift.

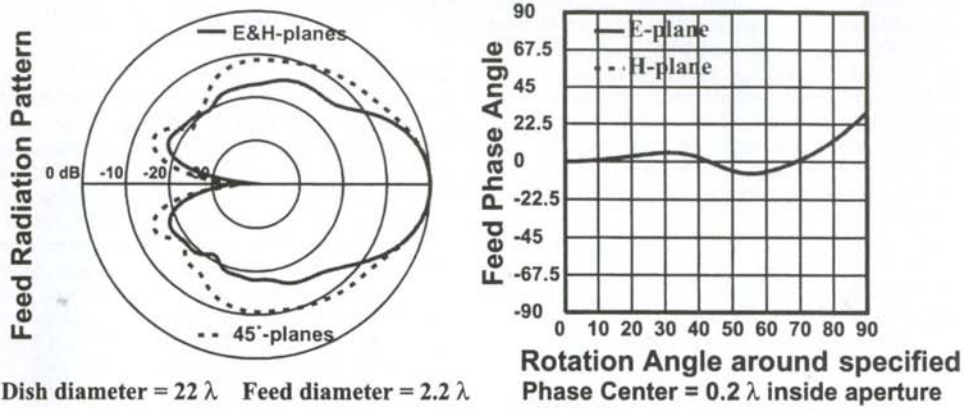
The simplest septum polarizer is just a linear taper, and it seems to work well in the square feed. Davis, et. al., suggest[4] 30° as an appropriate taper for a septum polarizer, so I added a 30° septum to a VE4MA feed with relatively small diameter circular waveguide, so that it would be close to cutoff. The resulting radiation patterns were OK, but the polarization ratio (the ratio of desired to undesired polarization) was not: the undesired sense was only about 10 dB down, so that efficiency would be reduced since about 1/10th of the energy is in the wrong polarization.



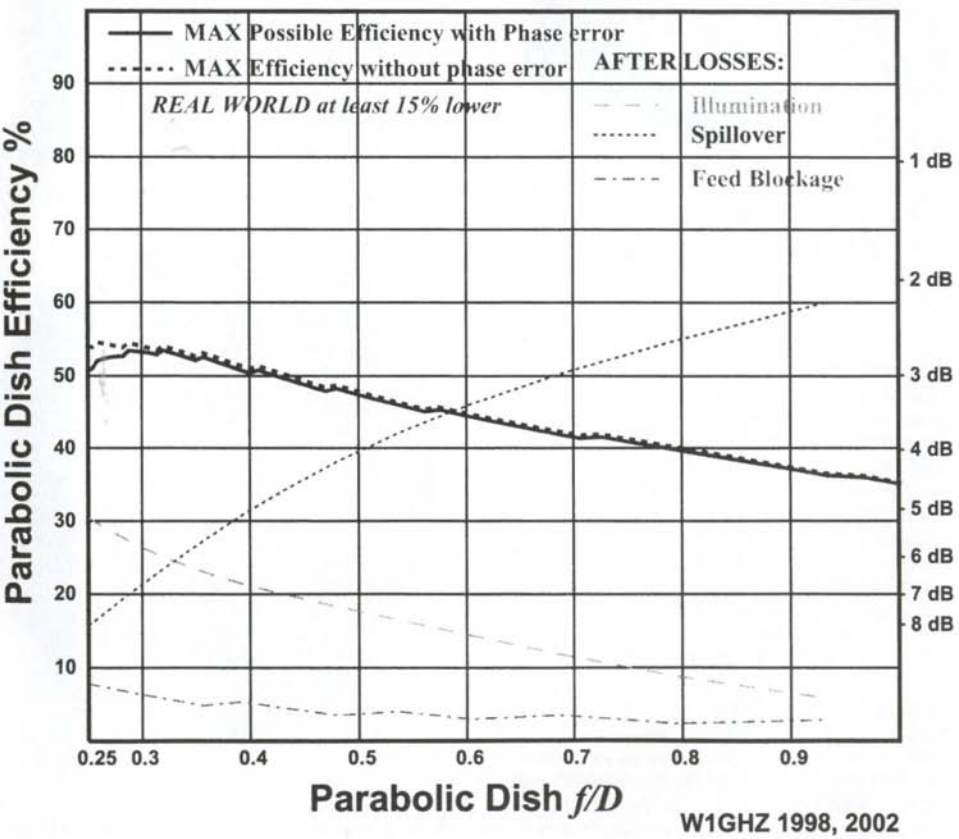
The polarization ratio was also sensitive to frequency, so I fiddled with the waveguide diameter. The best I could find with a 30° septum taper was a polarization ratio of about 13 dB, at a waveguide diameter of about 0.7λ. Since this is far worse than the stepped taper in a square guide, perhaps the stepped taper might be needed in a circular guide also.

Septum feed with 1.7λ square choke, LHCP at 1296 MHz

Figure 17



Dish diameter = 22 λ Feed diameter = 2.2 λ



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Lacking a spreadsheet for circular guide, I decided to try a quick approximation. I adjusted the frequency in Zdenek's spreadsheet for square guide until the septum height matched the 0.7λ waveguide diameter, then used the calculated step dimensions. A cartoon cutaway of this feed is shown in Figure 19. I don't know whether these are the best dimensions, but they work pretty well: a VE4MA feed with these dimensions has a polarization ratio around 22 dB at 1296 MHz, and good isolation between ports. The calculated radiation patterns and efficiency are shown in Figure 20; best calculated efficiency is about 68% at an ***f*/D** around 0.35 to 0.45. This is similar performance to the original square septum feed, but with a larger blockage shadow. As might be expected, the 3D pattern in Figure 21 has no corner lobes, since all the cross-sections are round.

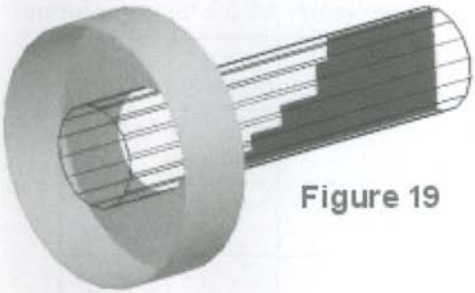


Figure 19

Input probes

Since the intent was to examine feedhorn performance, these simulations were all done with single-mode waveguide excitation. The only exception was one with input probes to
The OK1DFC dimensions, to make sure the probes do not affect the basic radiation pattern. The calculated patterns and efficiency were identical, but the probe version had higher isolation, shown in Figure 22. Achieving such high isolation in an actual feed would require careful construction, and then reflections from the dish surface would still reduce the isolation as described above.

Because the septum cuts the guide in half in the input area, the probe length is limited. The optimum probe length might be very close to the septum, particularly in circular guide, close enough to arc over with high power. For the square guide, Zdenek has shortened the probe length and compensated with a tuning screw to add capacitance, a reasonable solution. Anyone wishing to add a septum polarizer to a VE4MA feed with probe excitation will have to empirically find probe and tuning screw dimensions for the circular guide. Since the polarization and isolation are taken care of by the septum, only the VSWR of each probe must be adjusted.

Summary

The septum feeds are impressive – good circular polarization performance with no adjustments. The other common ways to achieve circular polarization use two orthogonal probes phased by 90°; the phasing is achieved with an external 3-dB hybrid or a phasing section in the guide, often a series of screws to provide a slow-wave structure for one polarization. The screws require careful adjustment to achieve good circularity and good VSWR, while the external hybrid and cabling adds some losses. The septum polarizer offers the possibility of good, low-loss, circular polarization with no adjustments.

The septum polarizer looks like a good way to make a circularly polarized feedhorn with no adjustments required. The simple square cross-section described by OK1DFC is ideal for low blockage on small deep dishes, while a choke may be added for better performance on larger dishes.

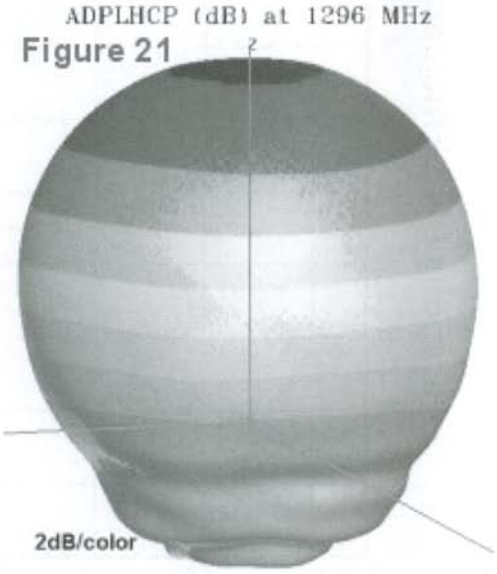
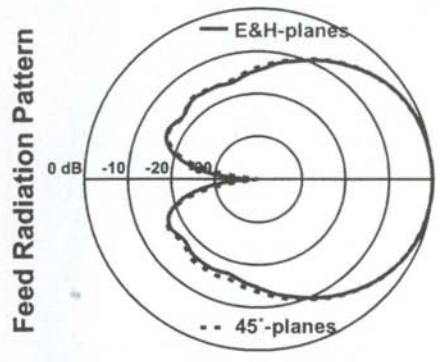


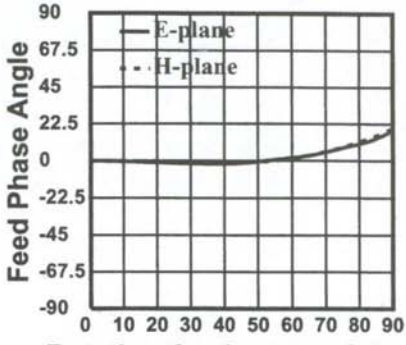
Figure 21

A flare section to increase the aperture will better illuminate shallow and offset dishes. The septum polarizer can also be used in cylindrical horns like the VE4MA feed.

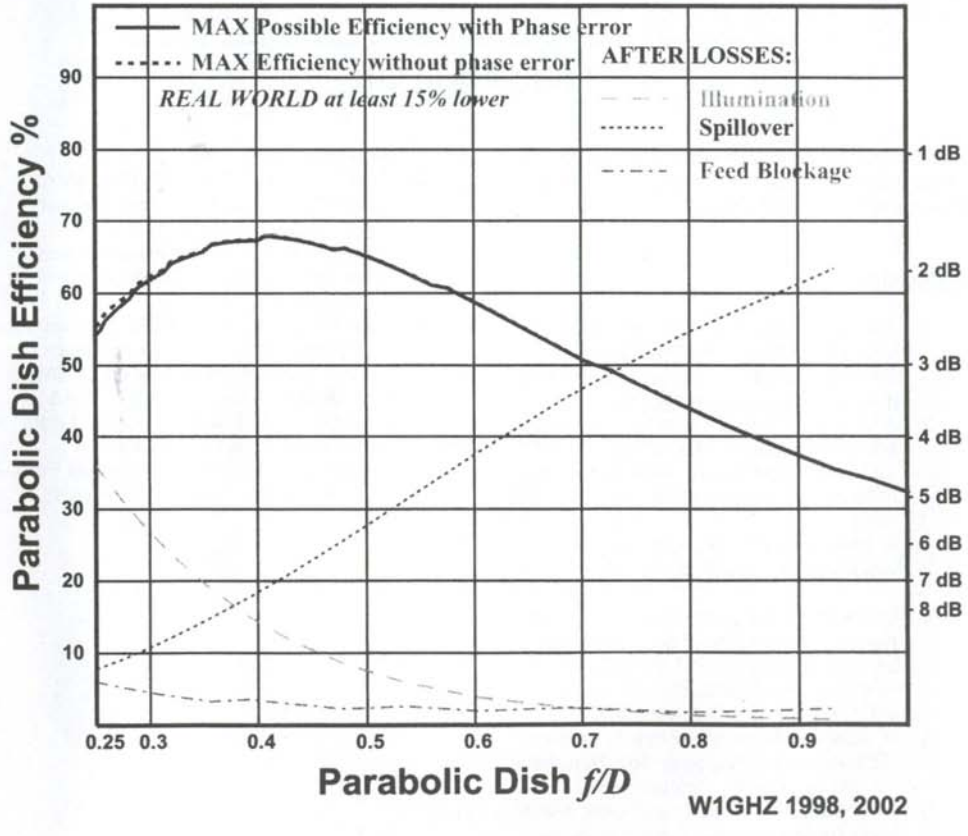
VE4MA feed with stepped septum, LHCP at 1296 MHz

Figure 20





Dish diameter = 18 λ Feed diameter = 1.8 λ



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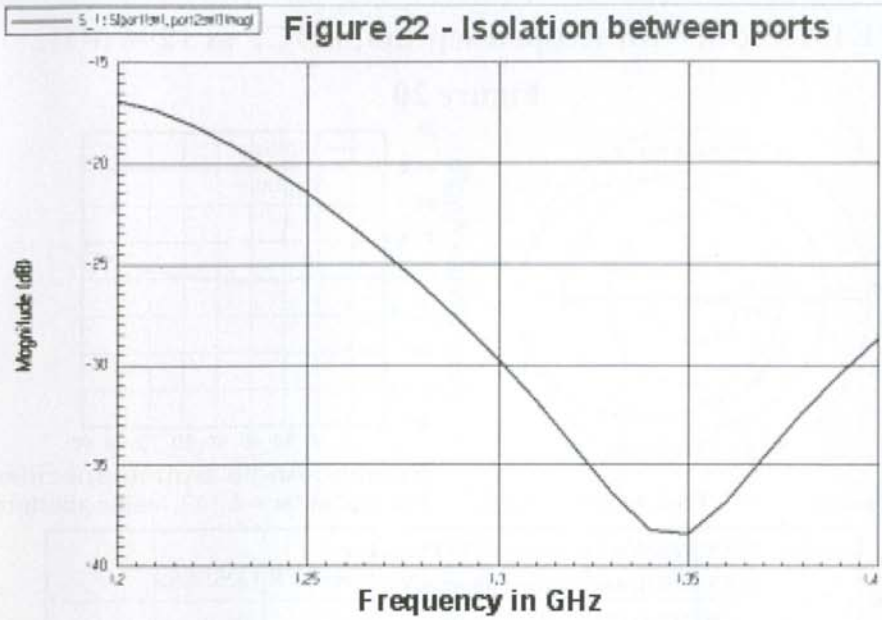

Figure 22 - Isolation between ports

More information is available on the OK1DFC (www.qsl.net/ok1dfc) and W1GHZ (www.w1ghz.org) web pages.

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Analyse des Septum Feeds von OK1DFC

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Das Septum Feed (1) wurde von Zednek, OK1DFC, bei der 10. Internationalen EME-Konferenz 2002 in Prag vorgestellt. Die Ergebnisse in der Praxis waren vielversprechend, aber, wie bei jeder neuen Antenne, gab es Fragen, wie gut denn diese Konstruktion wirklich arbeitet.
Computersimulationen ergeben, dass dieses Feed gut arbeiten sollte und dass durch Variationen dieses Feed für Spiegel über einen bestimmten f/D-Bereich verwendet werden kann.
Auch kann der Septum-Polarisator ggf. zur Erzeugung von zirkularer Polarisation in anderen Feedhörnern verwendet werden.

Beschreibung

Das Septum Feed, so wie es von OK1DFC beschrieben wird, ist ein nicht aufgeweitetes viereckiges (quadratisches) Horn oder einfach ein quadratischer Hohlleiter, in denen sich innen mittig eine abgestufte Trennwand, das sogenannte Septum, befindet, welches die zirkulare Polarisation erzeugt. Abb. 1 zeigt den Blick in das Horn von vorne. Abb. 2 zeigt ein Foto eines teilweise aufgebauten Horns, auf dem man das stufige Septum gut erkennen kann. Abb. 3 zeigt dies noch mal schamatisch, eine Seitenwand des Horns ist hier weggelassen. Das Horn wird mit Eingängen auf beiden Seiten des Septums erregt, wobei jede Seite eine der Komponenten der zirkularen Polarisation erzeugt.
Bei EME-Betrieb kann man so getrennt eine Seite zum Senden und eine Seite zum Empfangen mit jeweils entgegensgesetzter Polarisation benutzen.
Die Erregung kann mittels zweier rechteckiger Hohlleiter erzeugt werden, die jeweils so groß sind wie das halbe Horn, oder mittels zwei senkrecht zum Septum beidseitig eingeführten Sonden, die als integraler Übergang von Koax auf Hohlleiter dienen. Beide Methoden sollten gleiche Ergebnisse bringen, vorausgesetzt, dass der Hohlleiter vor dem Septum lang genug ist, um unerwünschte Signale zu unterdrücken.

Das strahlende Element ist auf die Öffnung bezogen eine einfaches quadratisches Horn. Um 45 Grad gedreht ist es identisch mit einem diagonalen Horn (2). Wenn das Diagonale Horn mit zirkularer Polarisation erregt wird, sollte sich ein identisches Strahlungsdiagramm ergeben. N7ART (3) hat gezeigt, dass das diagonale Horn ein guter Feed ist. Deshalb sollte auch der Septum Feed gut funktionieren. Die Ausführung nach N7ART verwendet gephaste Kreuzdipole und zirkulare Polarisation zu erzeugen, eine Methode, die auf den höheren Frequenzen heikel wird. Die Septum-Technik könnte hier eine bessere Methode sein.

Das Septum das etwas komplizierter. Eine zirkular polarisierte Welle, die die Öffnung des Horns erreicht, kann -gedanklich- in zwei Polarisations-Komponenten zerlegt werden, die sich um 90 Grad in der Phase unterscheiden, die eine parallel zum Septum, die andere senkrecht dazu.
Die parallele Komponente wird duch das Septum gleichmäßig aufgeteilt und erreicht die beiden eckigen Eingangs-Hohlleiter.
Die Sperrfrequenz für die senkrechte Komponente wird durch das Septum verändert, so dass die Wellenlänge der senkrechten Komponente kleiner wird. Folglich ist die elektrische Länge des Septums für die senkrechte Komponente größer als für die parallele Komponente.
Wenn die Differenz dieser Länge ¼ Lambda bzw. 90 Grad entspricht, dann erreichen die horizontale und die vertikale Komponente am Eingan in Phase.
Auf der einen Seite addieren sich die Komponenten, auf der anderen löschen sie sich aus, je nach Art der zirkularen Polarisation, so dass die beiden Eingänge voneinander isoliert sind.
Um die nötige Differenz der elektrischen Länge im physikalisch machbaren Bereich zu haben, arbeitet der Septum-Polarisator nahe der Sperrwellenlänge des Hohlleiters.

Abb. 4 zeigt die simulierte Verteilung des E-Feldes in einem durchsichtigen Septum Feed. Durch die linke Seite ist die senkrecht zum Septum stehende Polarisationskomponente sichtbar, auf der anderen Seite ist die parallele Komponente sichtbar.
Die dunklen Bereiche hoher Feldintensitäten sind entlang jeder Seitenwand durch ½ Lambda-g getrennt. So können wir sehen, dass am offenen Ende ein Abstand von ¼ Lambda vorhanden ist. Im Bereich der Stufen des Septums aber sind komplexere Differenzen erkennbar. Die Auslöschung an der hinteren Einkoppel-Sonde ist ebenfalls klar.

Die ersten Septum-Polarisatoren (4) haben ein gleichmäßig schräges Septum mit einem ca. 30 Grad (Halb-)Kegel verwendet, wie es in der Abb. 5 zu sehen ist. Diese Version (5) hat nur eine begrenzte Bandbreite und Isolation, weshalb das abgestufte Septum (6) entwickelt wurde, dass eine bessere Bandbreite und Isolation bietet.

Alle Quellen besagen, dass eine Berechnung des Feldes in der Nähe des Septums sehr schwierig ist, d.h. eine mathematische Analyse in diesem Bereich ist nicht möglich.
Bei Chen & Tsandoulas (6) findet man jedoch ein Beispiel mit Abmessungen. Dieses hat OK1DFC analysiert und auf Amateurfunkfrequenzen im Maßstab umgerechnet. Da das erwähnte Beispiel nur nur ein eckiges Horn von 0.635 Lambda gilt, und nicht bekannt ist, wie man ein Septum für andere Horngrößen berechnet, sind wir auch an diese Größe gebunden. Es sollte auf allen Frequenzen gleich gut funktionieren, solange alle Dimensionen immer im Maßstab umgerechnet werden.

Simulationen

Ein Septum Feed für 1296 MHz mit den von OK1DFC spezifizierten Abmessungen wurde mit der HFSS Software von Ansoft (7) simuliert. Das damit berechnete Strahlungsdiagramm (Abb. 6) zeigt eine breite Ausleuchtung, so wie es für ein kleines Horn erwartet wird. So wie bei anderen offenen Hohlleiter-Feeds sind die Keulen nach hinten relativ groß und nur etwa 12 dB unterdrückt, so dass die Effektivität auf etwa 68% reduziert ist. Das ganze bei einem besten f/D von 0.35 bis 0.4. Die Diagramme für links- und rechtdrehende zirkulare Polarisation sind ziemlich gleich.
Diagramme für beide Erregungsmöglichkeiten (Sonde und Hohlleiter) wurden berechnet. Auch diese Diagramme waren sehr ähnlich, so dass der Abstand von der Sonde zum Septum richtig sein muß.

Vorangegangene Simulationen von diagonalen Feeds (8) mit linearer Polarisation zeigten gute Strahlungsdiagramme, aber eine reduzierte Effektivität aufgrund der großen rückwärtigen Nebenzipfel, so wie sie für offene Hohlleiter-Feeds typisch sind. Quadratisch / eckige Hörner (9) mit zu den Seiten paralller linearer Polarisation zeigen ebefalls große Nebenzipfel im E-Diagramm.
Da der Vektor der zirkularen Polarisation dauernd zwischen diesen beiden Fällen dreht, können wir eventuell hierfür ein Diagramm erwarten, das eine Kombination aus dem des diagonalen und des quadratischen Horns ist.
Das zirkulare Diagramm des Septum Feeds, siehe die 3D-Darstellung in Abb. 7, sieht so aus, wie wir uns diese Kombination eventuell vorstellen: Seitenzipfel an den vier Ecken wie beim diagonalen Horn, erzeugt durch den Polarisations-Vektor, wenn er horizontal und vertikal durch das quadratische Horn läuft.
Die Seitenzipfel an den Ecken reduzieren die berechnete Effektivität um vielleicht etwa 4% verglichen mit einer Berechnung, die nur die herkömmlichen horizontalen und vertikalen Diagramme berücksichtigt.

Die zirkulare Polarisation ist recht gut, die Kreuz-Polarisation ist etwa 21 dB unterdrückt und die Zirkularität ist gut.
Die Isolation zwischen den beiden Eingängen beträgt bei 1296 MHz rund 24 dB bei brauchbarer Bandbreite, d.h. guter Isolation von mindestens 1.2 bis 1.4 GHz. Man muß beachten, dass die Reflektion am Parabolspiegel die zirkulare Polarisation umkehrt, so dass die Reflektion, die zurück ins Horn gelangt, die Isolierung vermindert.

Während die berechnete Effektivität dieses Feeds nicht so hoch ist, wie die manch andere, so habe diese dann eine größere Abschattung, so dass das Septum Feed eventuell die beste Lösung bei kleinen Spiegeln darstellt, wenn zirkulare Polarisation benötigt wird.

Eine Simaulation mit einem einfachen 30 Grad Kegel-Septum zeigt eine sehr ähnliche Performance bei 1296 MHz.. Die isolation zwischen den Eingängen ist hoch über einen schmaleren Bereich von etwa 100 MHz. Dies ist für Amateurzwecke brauchbar und das gewinkelte Septum kann auf höheren Frequenzen einfacher angefertigt werden.

Spiegel mit anderen f/D

Das diagonale Horn kann so dimensioniert werden, dass Spiegel mit verschiedenen f/D-Verhältnissen ausgeleuchtet werden können, indem die Dimenionen des diagonalen Teils verändert werden oder eine aufgeweitete Sektion für größere f/D hinzugefügt wird.
Da das Septum zur Erzeugung der zirkularen Polarisation von den Dimensionen des Hohlleiters abhängt und diese nahe der Sperrfrequenz sein müssen, ist die Größe der quadratischen Sektion mit 0,63 Lambda für eine gegebene Arbeitsfrequenz festgelegt. Es kann jedoch eine aufgeweitete Sektion hinzugefügt werden, um die Öffnung zu erweitern und so das Horn für größere f/D zu optimieren, so dass das Septum Feed für jeden Spiegel mit f/D > 0.3 benutzt werden kann.
Da es keine guten Feeds für sehr tiefe Spiegel gibt, müsste das Septum Feed hier wahrscheinlich genauso gut oder schlecht wie alle anderen sein.
Die aufgeweitete Sektion ist ähnlich der bei einem rechteckigen Hohlleiter-Horn, mit dem Unterschied, dass sie hier einen viereckigen Querschnitt haben muss.
Recheckige Hörner benötigen unterschiedliche Abmessungen der Öffnungen in der E- und H-Ebene, um einen gleichen Öffnungswinkel zu erreichen. Dagegen hat die zirkulare Polarisation beim Septum keine feststehenden Ebenen – sie drehen sich fortlaufend im Kreis -, weshalb ein quadratischer Querschnitt verwendet werden sollte (eventuell wäre auch eine achteckige von Vor-

teil).
Die Aufweitung sollte eine leichte Kegelform haben, so wie in Abb. 8. (Hier ist wieder die eine Vorderwand offen, um das Septum zu erkennen).

Zuerst versuchte ich eine aufgeweitete Sektion mit einer quadratischen Öffnung von 1.4 Lambda und einem Aufweitungswinkel von 30 Grad (15 Grad auf jeder Seite des Septums), da diese Größe bei einem diagonalen Horn mit linearer Polarisation einen guten Feed für Offset-Spiegel mit einem äquivalenten f/D um 0.7 ergibt.
Mit einem Septum Feed ergibt sich für zirkulare Polarisation nach Abb. 9 eine hohe errechnete Effektivität für f/D von 0.7 bis 0.85, was für viele Offset-Spiegel gut ist. Dieses Horn hat hinten viele größere Nebenzipfel an den Ecken im Diagramm, das wie eine Rakete mit Flossen aussieht (Abb. 10).
Nimmt man eine mittelgroße Aufweitung mit einer quadratischen 1.1 Lambda Öffnung, ergibt sich ein Strahlungsdiagramm nach Abb. 11 mit hoher Effektivität bei mittleren f/D, am besten bei 0.5 bis 0.6. Die Nebenzipfel an den Ecken sind hier im 3D-Diagramm weniger stark ausgeprägt, siehe Abb. 12.
Beide aufgeweiteten Septum Hörner zeigen gute Eigenschaften bei Isolation und Kreuz-Polarisation.
Da der Öffnungswinkel des Horns von der Größe der Öffnung abhängig ist, kann man für ein beliebiges f/D eine passende Öffnungsgröße wählen, indem man zwischen den drei eben genannten Größen 0.63, 1.1 und 1.4 Lambda interpoliert.
Bei kleineren Öffnungen sollte auch der Winkel klein sein, so dass der aufgeweitete Teil relativ lang wird.

Chokes

Beim Feed nach VE4MA (10) wird ein Choke Ringe („Glättungsring") um einen runden Hohlleiter Feed angeordnet, um die hinteren und seitlichen Nebenzipfel zu reduzieren. Dadurch steigt die Effektivität des Feeds, mehr Energie erreicht den Reflektor. Da das nicht aufgeweitete Septum Feed hinten ziemlich große Nebenzipfel hat, könnte hier ein Choke das Septum Feed eventuell auch verbessern. In Abb. 13 sehen wir ein Septum Feed mit einem runden Choke.
Ein Hinzufügen eines runden Chokes mit denselben Dimensionen wie beim VE4MA-Feed (419mm Durchmesser und 121mm Tiefe für 1296 MHz) ergab in der Simulation eine signifikante Reduzierung der hinteren Nebenzipfel, wie in Abb. 14 ersichtlich ist. Die errechnete Effektivität ist auf 72% angestiegen, bei optimalem f/D von 0.33 bis 0.43. Das 3D-Diagramm in Abb. 15 zeigt, dass der runde Choke die Zipfel an den Ecken eleminiert. Die Isolation zwischen den Eingängen ist immer noch gut, die Kreuzpolarisation ist mit 19 dB etwas schlechter. Allerdings hat die höhere Effektivität ihren Preis: Die Größe der Abschattung hat sich von 0.63 Lambda im Quadrat auf 1.8 Lambda Durchmesser vergrößert, was bei kleinen Spiegeln ein signifikanter Unterschied ist.

Da das Septum Feed wahrscheinlich durch Schneiden und Biegen einer Metallplatte hergestellt wird, wäre es naheliegend, dass ein eckiger Choke wie in Abb. 16 einfacher herzustellen ist als ein runder. Aus dem runden Choke habe ich eine größe von 1.7 Lambda im Quadrat für den eckigen abgeleitet, bei einer gleichen Tiefe von 121mm. Wie Abb. 17 zeigt, arbeitet der eckige Choke nicht annähernd so gut wie der runde. Die Effektivität sindkt und das 3D-Diagramm (Abb. 18) ähnelt einer Paprika. Ich kann nicht sagen, ob es die Form oder die Abmessungen sind, die hier die Performance herabsetzen, aber man sollte dann wohl doch mit einem runden Choke arbeiten.

Das VE4MA-Feed mit Septum

Der Septum-Polarisator scheint bei der Erzeugung zirkularer Polarisation in quadratischen Querschnitten gut zu arbeiten, ein Abgleich ist dabei nicht nötig. Fraglich ist, ob ein Septum-Polarisator auch in einem runden Hohlleiter arbeitet. Eine Quelle (11) beschreibt ein gestuftes Septum in einem runden Hohlleiter, das mit einem Computer-Programm berechnet worden sei. Als Ergebnis wurden die relativen Sperrwellenlängen der parallelen und senkrechten Komponenten gegen die Höhe der Stufen geplottet. Um dann 90 Grad Phasenverschiebung zu erreichen, seien die Längen experimentell justiert worden.

Der einfachste Septum Polarisator ist ein linearer Kegel, und der scheint in einem quadratischen Feed gut zu arbeiten. Davis et al. (4) schlagen als Winkel 30 Grad für einen geeigneten Kegel eines Septum-Polarisators vor. Also habe ich ein 30 Grad Septum in ein VE4MA Feed eingesetzt, das aus einem runden Hohlleiter mit relativ geringem Durchmesser besteht, damit es nahe an der Sperrgrenze liegt. Die sich ergebenden Diagramme waren o.k., aber das Polarisations-Verhältnis (das Verhältnis von erwünschter zu unerwünschter Polarisation) war nicht in Ordnung: Der unerwünschte Anteil war nur um 10 dB unterdrückt, so dass die Effektivität reduziert war, da etwa 10% der Energie in der falschen Polarisation war.
Das Polarisationsverhältnis wat außerdem auch abhängig von der Frequenz, so dass ich mal mit dem Duchmesser des Hohlleiters gespielt habe. Mit einem 30 Grad Kegelseptum konnte so als bestes ein 13dB Polarisationsverhältnis bei einem Hohlleiterdurchmesser von etwa 0.7 Lambda. Da dies weitaus schlechter ist, als bei einem gestuften

Septum in einem viereckigen Hohlleiter, ist eventuell auch in einem runden Hohlleiter ein gestuftes Septum besser.
Da keine genauen Maßvorgaben für einen runden Hohlleiter existieren, habe ich mich für eine Näherungsrechnung entschieden.
Dazu habe ich die Frequenz in Zdeneks Abmessungen für den eckigen Hohlleiter so angepasst, bis die Höhe des Septums zum 0.7 Lambda Durchmesser des runden Hohlleiters passte. Dann habe ich die angegebenen Abmessungen für die Stufen benutzt. Eine schematische Zeichnung davon ist in Abb. 19 zu sehen. Ich weiß nicht, ob diese Abmessungen optimal sind, aber es funktioniert so recht gut. Ein VE4MA-Feed mit diesen Abmessungen hat ein Polarisationsverhältnis von etwa 22 dB bei 1296 MHz und eine gute Isolatoon zwischen den Eingängen. Die Effektivität beträgt rund 68% bei f/D von 0.35 bis 0.45. Diese Performance entspricht der des originalen viereckigen Septum-Feeds, allerdings gibt es eine größere Abschattung. Wie zu erwarten, zeigt die 3D-Simulation in Abb. 21 keine Nebenzipfel an den Ecken, da ja alles „rund" ist.

Einkopplung

Da hier die Performance des Feedhorns untersucht werden sollte, wurde die Simulationen alle gleich mit einem einfachen Verfahren für die Erregung durchgeführt. Einzig beim OK1DFC-Typ wurden auch die Einkoppel-Sonden einmal simuliert, um nachzuweisen, dass diese keinen Einfluß auf das Strahlungsdiagramm haben.
Dabei stellte sich heraus, dass das Diagramm und die Effektivität gleich waren, bei der Version mit den Sonden war lediglich die Isolation höher, wie in Abb. 22 ersichtlich ist. Eine solche Isaloation in der Praxis zu erreichen, erfordert eine sorgfältige Konstruktion des Horns. Hinzu kommt dann immer noch die Reduzierung der Isolation durch die Reflektion am Spiegel, wie oben bereits erwähnt.

Da das Septum den Hohlleiter im Eingangsbereich in zwei Hälften teilt, ist die Länge der Einkoppelsonde begrenzt. Die optimale Länge der Sonde ist oft so, dass man recht nahe ans Septum heran kommt, besonders bei runden Hohlleitern. Dann kann es bei hoher Leistung zu Überschlägen kommen. Bei dem viereckigen horn hat OK1DFC deshalb die Länge der Sonde verkürzt und als Kompenation eine zusätzliche Abstimmschraube eingesetzt um die Kapazität zu erhöhen. Dies ist eine brauchbare Lösung.
Wenn jemand ein Septum-Polarisator im VE4MA-Feed mit Erregung durch eine Sonde bauen will, müssen die Länge der Sonde und die Abmessung der Abstimmschraube für den runden Hohlleiten noch empirisch ermittelt werden.
Da Polarisation und Isolation durch das Septum bestimmt werden, muß die Sonde lediglich auf bestes VSWR einjustiert werden.

Zusammenfassung

Septum-Feeds sind beeindruckend – sie ermöglichen eine gute Performance für zirkulare Polarisation ohne Justierungen.
Andere gebräuchliche Verfahren zur Erzeugung zirkularer Polarisation verwenden zwei orthogonale Sonden, die 90 Grad phasenversetzt arbeiten. Dies wird durch einen externen 3dB Hybrid oder einen Phasenschieber im Hohlleiter erreicht. Oft wird mittels einer Reihe von Schrauben eine Verlangsamungsstrecke für eine Polarisation erreicht. Das Einstellen dieser Schrauben muß sehr sorgfältig geschehen, um gute Zirkularität und gutes VSWR zu erreichen. Die externen Hybride und Kabel verursachen zusätzliche Verluste.
Der Septum-Polarisator ermöglicht verlustarm eine gute zirkulare Polarisation Polarisation, ohne irgendwelche Justierungen.
Der einfache quadratische Querschnitt wie er von OK1DFC beschrieben wurde ist aufgrund der geringen Abschattung ideal für kleine, tiefe Spiegel. Ein Choke kann für bessere Performance bei größeren Spiegeln hinzugefügt werden. Eine aufgeweitete Sektion kann hinzugefügt werden, um die Öffnung zu vergrößern und damit flache und Offset-Spiegel besser auszuleuchten.
Der Septum-Polarisator kann auch in zylindrischen Hörnern, wie dem VE4MA-Feed, eingesetzt werden.

Informationen und praktische Hinweise für die Konstruktion eines Septum-Feeds

Zdenek Samek, OK1DFC
ok1dfc@tesmail.cz

Warum ein Septum-Polarisator?

- Erzeugung zirkularer Polarisation über 1 GHz
- Erzeugung linksdrehender und rechtsdrehender Polarisation ohne einen 90 Grad Hybrid und ohne TX-RX-Relais
- Einsparung von 1.5 dB auf der RX+TX-Seite
- Einsparung eines teuren High Power Relais

Eigenschaften des Septum-Polarisators

- Gute Isolierung zwischen RX und TX, bis zu 27.5 dB beim gestuften Septum nach Chen und Tsandoulas, bis zu 25 dB beim linear konischen Septum.

- Maximale Unzirkularität von 1.1 dB beim gestuften Septum, und von 2-3 dB beim linear konischen Septum.

Abb. 1 zeigt das Septum Feed im Vergleich zum VE4MA/W2IMU-Horn

Abb. 2 zeigt ein Schema zur Wirkungsweise des Septum-Polarisators

Abb. 3 zeigt die schmatisch den Durchgang der vertikalen Welle durch das Septum-Horn

Abb. 4 zeigt schmatisch den Durchgang der horzizontalen Welle durch das Septum Horn

Abb. 5 zeigt den schmatischen Aufbau des Septum Feeds

Abb. 6 zeigt ein Foto des RX-Ports am Septum-Horn des Autors.

Abb. 7 zeigt ein Foto des Septum-Horns von hinten mit den beiden Kompensationsschrauben in der Rückwand.

Praktische Hinweise

Zur Berechnung der Abmessungen steht eine Excel-Tabelle zur Verfügung, die im internet heruntergeladen werden kann unter:
www.qsl.net/ok1dfc/EME/Technic/septum/calc.xls

Alle Abmessungen sind in mm.
Als Material für das Feed sollte Aluminium oder Kupfer verwendet werden. Messing ist wegen Frostempfindlichkeit nicht gut geeignet.
Für Frequenzen bis 2.5 GHz ist eine Genauigkeit von bis 0.5mm bei den Maßen ausreichend. Für höhere Frequenzen muss auf 0.1mm genau gearbeitet werden.

Abb. 8 zeigt die Maße der Abstimmschraube

Abb. 9 zeigt den genauen Aufbau des Feed

Abb. 10 zeigt die Abmessungen für das Feed für 1296 und 2320 MHz

Abb. 11 zeigt die Abmessungen für das Septum für 1296 und 2320 MHz

Abb. 12 zeigt die Masse der Rückseite des Feed

Abb. 13 zeigt ein Feed für 10 GHz

Information and practical hints for the construction of a septum feed

Zdenek Samek, OK1DFC
ok1dfc@tesmail.cz

Reasons for a Septum Polarizer

- Producing circular polarization on frequencies over 1 GHz
- Pruducing LCP and RCP without the use of an 90 deg. Hybrid and without TRX-relay
- Saving 1.5 dB of losses on TX and RX port.
- Saving an expensive high power relay

Features

- Good isolation between RX and TX port, up to 27.5 dB using a Chen and Tsandoula septum with steps, up to 25 dB using a sloping septum.
- Maximal discircularity of 1.1 dB with the step septum and 2-3 dB with the sloping septum.

Fig. 1 shows the septum feed circuit compared with a VE4MA/W2IMU feed.

Fig. 2 shows a scheme of the working mechanism

Fig. 3 shows the vertical part of the wave going through the septum feed

Fig. 4 shows the horizontal part of the wave going through the septum feed

Fig. 5 shows the parts of the feed

Fig. 6 shows a picture of the RX-port of the authors`s septum feed

Fig. 7 shows a picture of the rear side of the septum feed with the two compensation screws

Practical hints

For calculation of the dimensions for different frequencies there is an Excel-Sheet available for download on the web:
www.qsl.net/ok1dfc/EME/Technic/septum/calc.xls

All dimensions are in mm.
Material for the feed should be Aluminium or Copper sheet. Brass gives problems at low temperatures. For frequencies up to 2.3 GHz an accuracy of 0.5mm is needed, for higher frequencies 0.1mm.

Fig. 8 shows the dimensions of the compensation srew

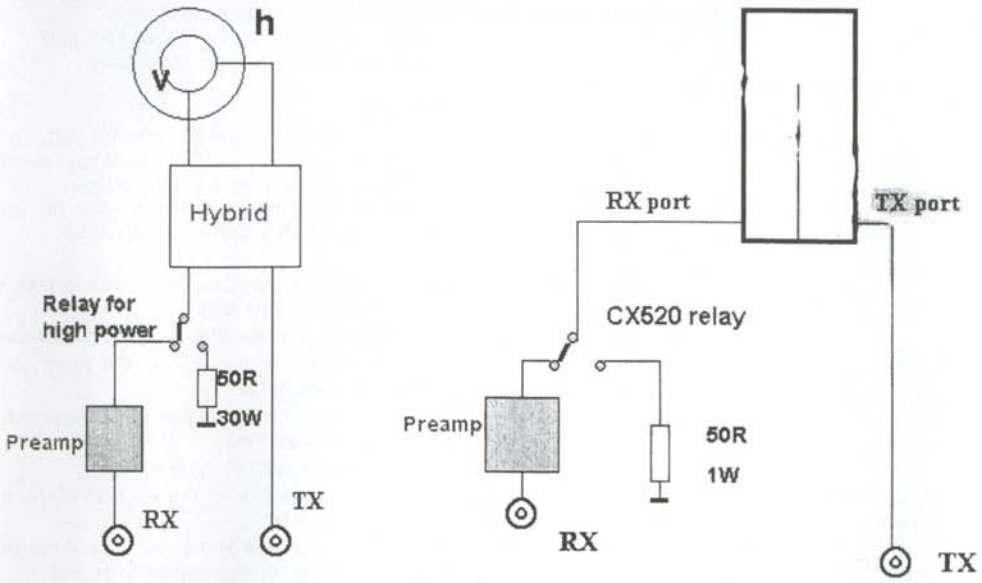
Fig. 9 shows the construction of the feed

Fig. 10 shows the dimensions of the feed for 1296 and 2320 MHz

Fig. 11 shows the dimensions of the septum for 1296 and 2320 MHz

Fig. 12 shows the dimensions of the rear side

Fig. 13 shows a septum feed for 10 GHz



VE4MA Fig. 1 / Abb. 1 Septum

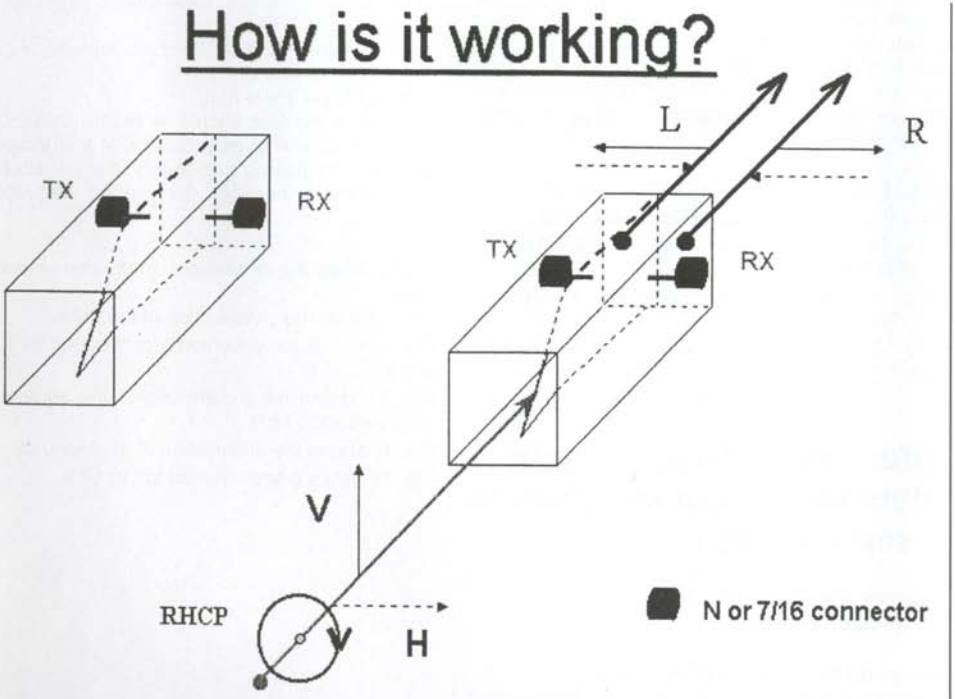
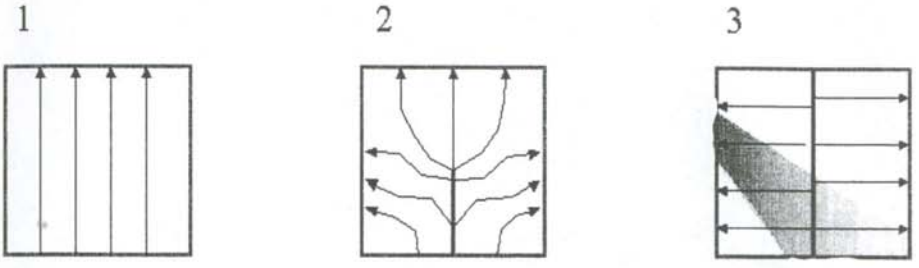


Fig. 2 / Abb. 2

Driving of transformer

Vertical part of electromagnetic wave

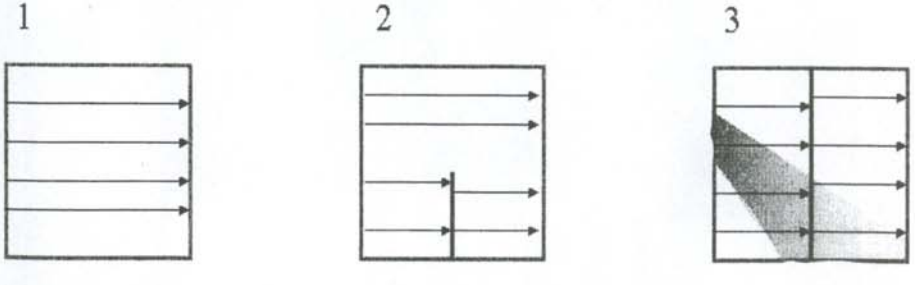


1. Four-square wave guide on the feed input
2. Septum transformer
3. Rectangular wave guide in RX – TX part, very close to by connector

Fig. 3 / Abb. 3

Driving of transformer

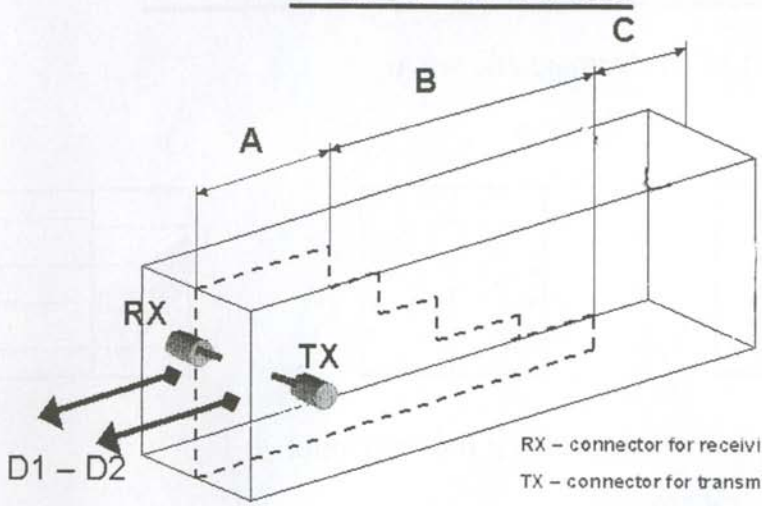
Horizontal part of electromagnetic wave



1. Four-square wave guide on the input
2. Septum transformer
3. Rectangular part of RX and TX wave guide

Fig. 4 / Abb. 4

Parts of feed



RX – connector for receiving cable

TX – connector for transmitting cable

D1 – D2 – compensation capacitors for set up SWR

A – Rectangular parts RX - TX

B – Transformer

C – For-square output wave guide

Fig. 5 / Abb. 5

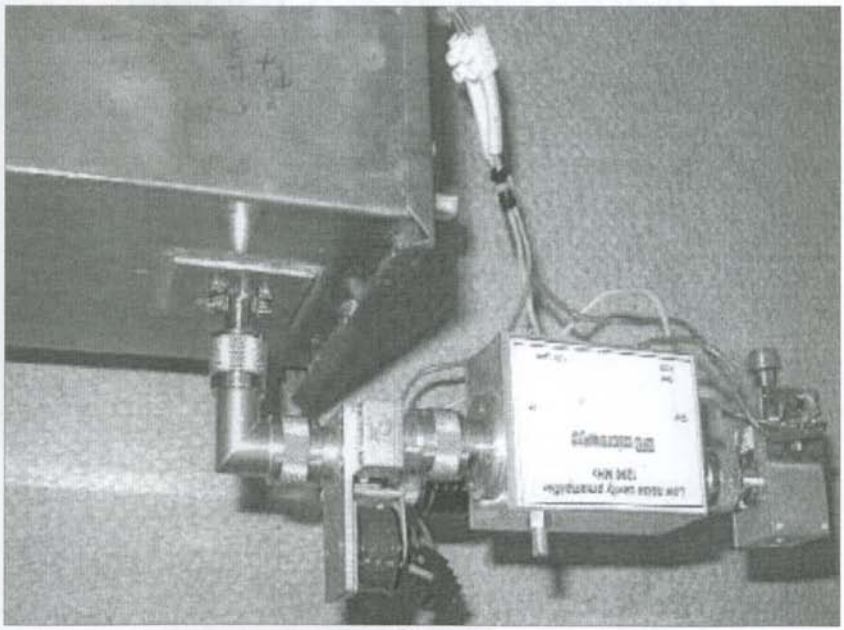


Fig. 6 / Abb. 6

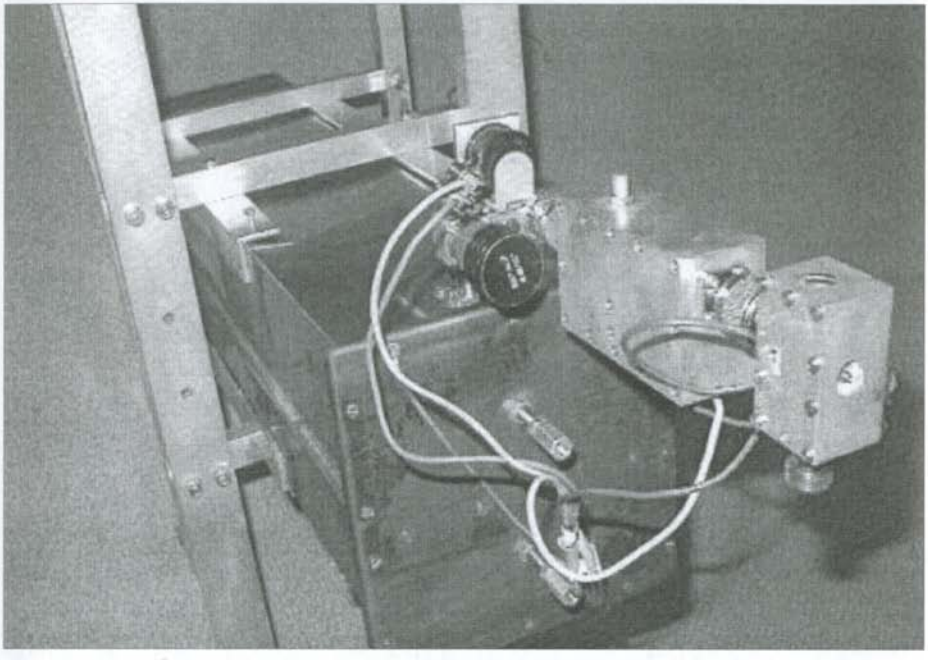


Fig. 7 / Abb. 7

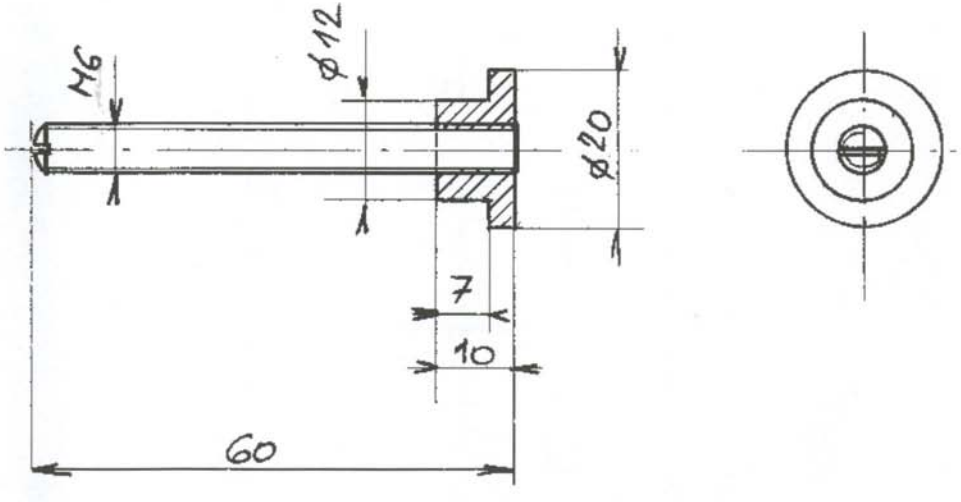


Fig. 8 / Abb. 8

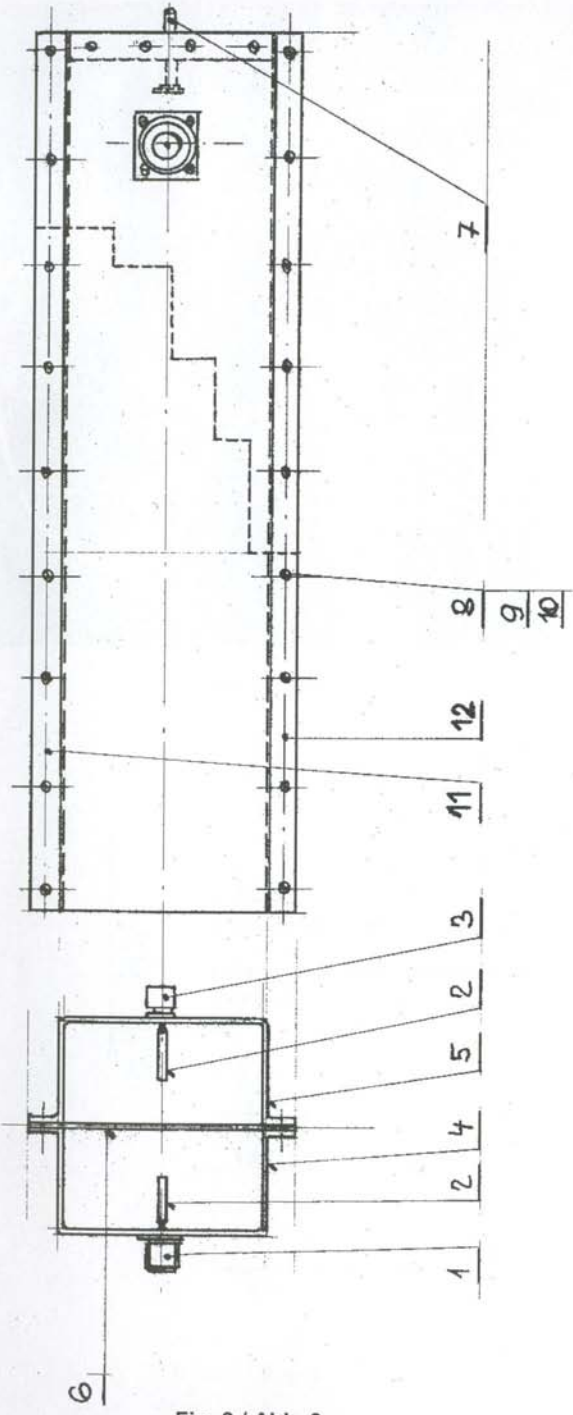


Fig. 9 / Abb. 9

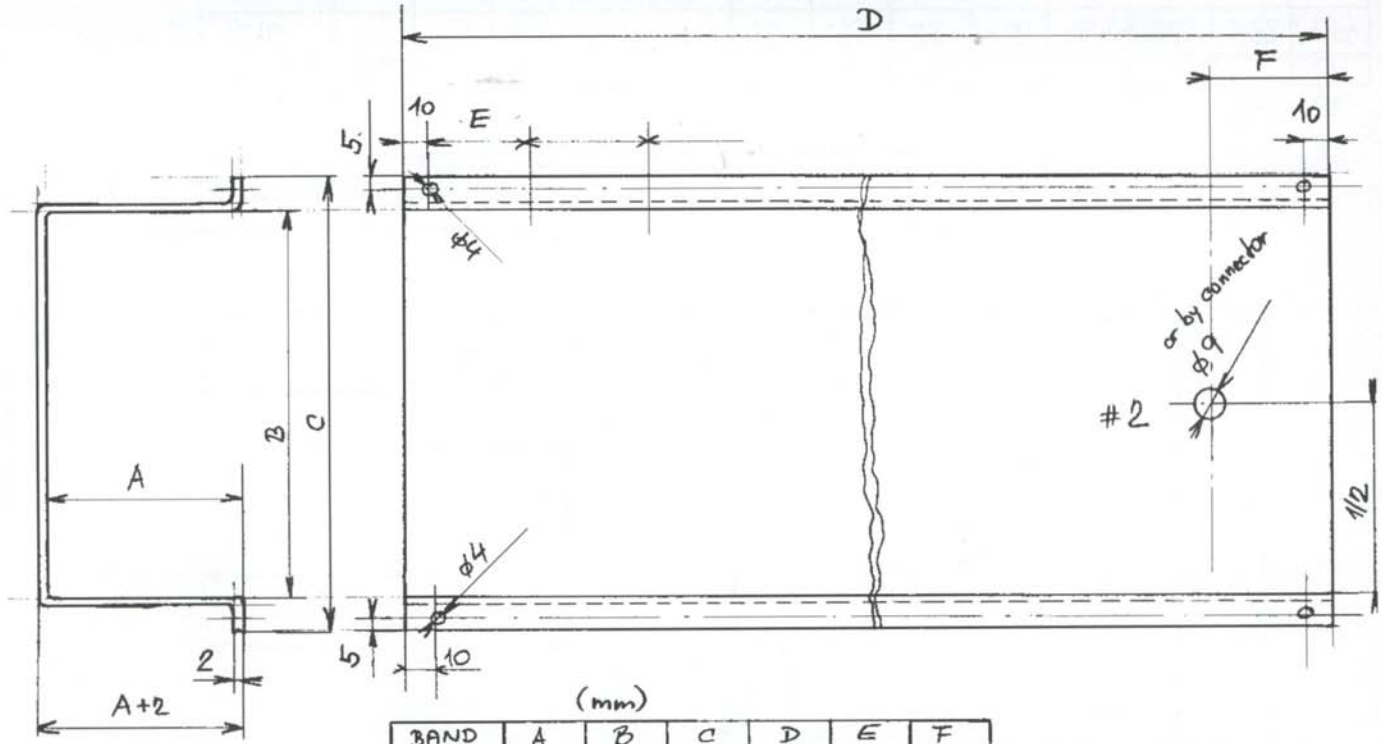


Fig. 10 / Abb. 10

(mm)

BAND	A	B	C	D	E	F
1296	72	145	169	612	30	44
2320	40	81	105	346	20	25

AL. sheet 2mm-2pcs

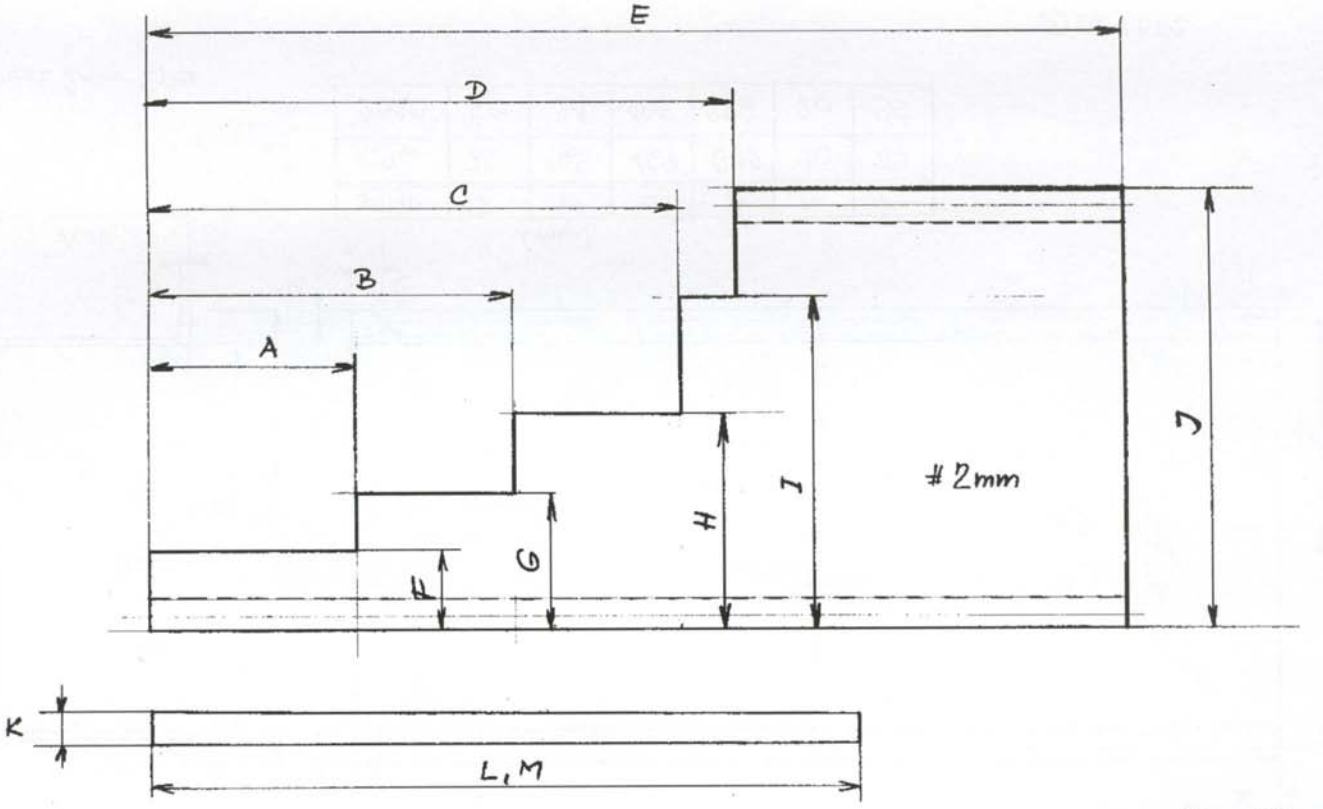
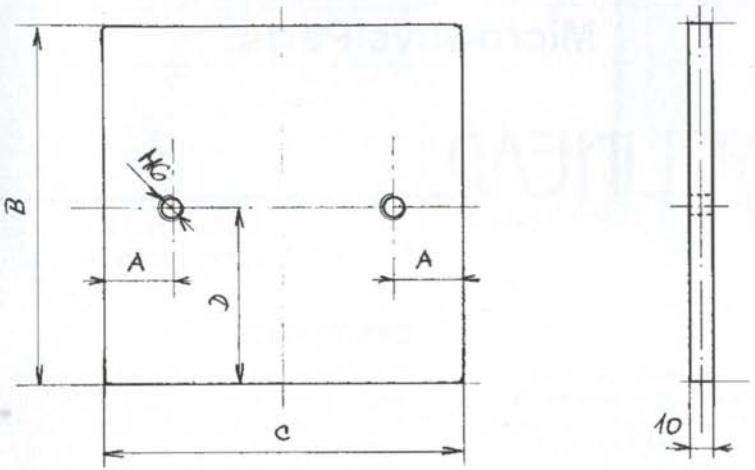


Fig. 11 / Abb. 11

(mm)

BAND	A	B	C	D	E	F	G	H	I	J	K	2 Pcs L	2 Pcs M
1296	78	138	201	222	370	31	53	82	126	169	12	232	454
2320	44	77	112	124	207	22	35	51	75	105	12	129	253



(mm)

BAND	A	B	C	D	
1296	21	145	146	72,5	1 Pcs
2320	12	81	82	40,5	1 Pcs

Fig. 12 / Abb. 12

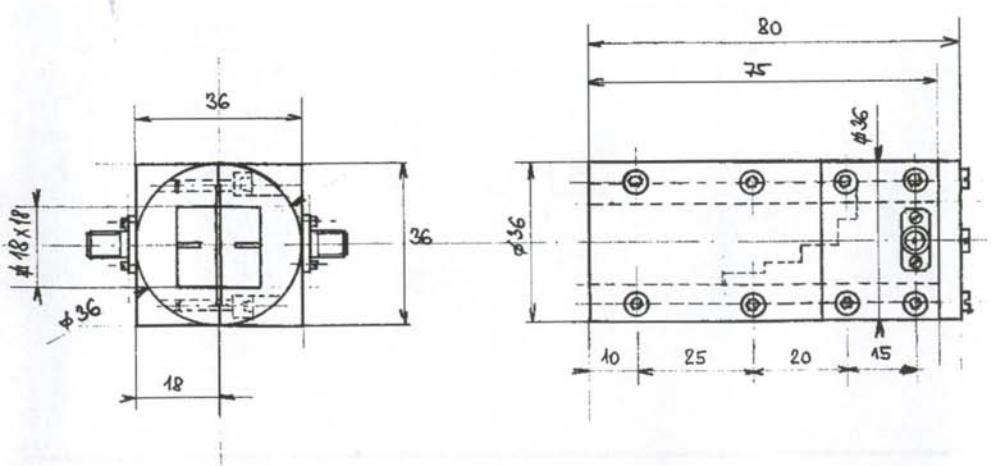


Fig. 13 / Abb. 13

INITIAL RELEASE
Final Electrical Specifications

LT5504

800MHz to 2.7GHz RF Measuring Receiver

January 2002

FEATURES

- **RF Frequency Range: 800MHz to 2.7GHz**
- **Ultra Wide Dynamic Range: 80dB Over Full Frequency Range and Over Temperature**
- **Wide Power Supply Range: 2.7V to 5.25V**
- Low Supply Current: 14.7mA at 3V
- Shutdown Current: 0.2µA
- 8-Lead MSOP Package

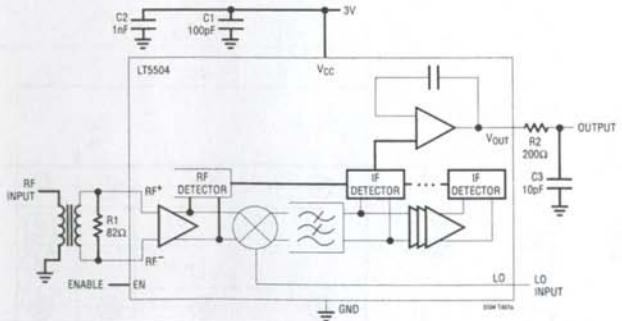
APPLICATIONS

- RSSI Measurements
- Receive AGC
- Transmit Power Control
- ASK and Envelope Demodulation
- GSM/TDMA/CDMA/WCDMA

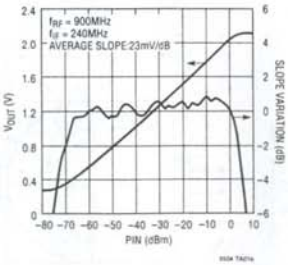
DESCRIPTION

The LT®5504 is an 800MHz to 2700MHz monolithic integrated measuring receiver, capable of detecting a wide dynamic range RF signal from –75dBm to +5dBm. The logarithm of the RF signal is precisely converted into a linear DC voltage. The LT5504 consists of RF/IF limiters, an LO buffer amplifier, a limiting mixer, a 3rd-order 450MHz integrated low pass filter, RF/IF detectors and an output interface. The ultrawide dynamic range is achieved by simultaneously measuring the RF signal and a down-converted IF signal obtained using the on-chip mixer and an external local oscillator. The RF- and IF-detected signals are summed to generate an accurate linear DC voltage proportional to the input RF voltage (or power) in dB. The output is buffered with a low output impedance driver.

TYPICAL APPLICATION



Output Voltage and Slope Variation vs RF Input Power

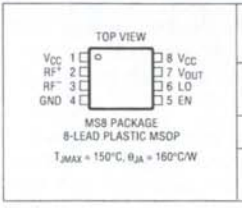


ABSOLUTE MAXIMUM RATINGS

(Note 1)

Power Supply Voltage 5.5V
V_{OUT}, EN ..... 0,V_{CC}
LO Input Power 6dBm
RF Input Power Differential (50Ω, 5.5V) 24dBm
RF Input Power Single-Ended (50Ω, 5.5V) 18dBm
Operating Ambient Temperature ..... –40°C to 85°C
Storage Temperature Range ..... –65°C to 150°C
Lead Temperature (Soldering, 10 sec) ..... 300°C

PACKAGE/ORDER INFORMATION



ORDER PART NUMBER
LT5504EMS8
MS8 PART MARKING
LTGP

Consult LTC Marketing for parts specified with wider operating temperature ranges.

PIN FUNCTIONS

V_{CC} (Pins 1, 8): Power Supply Pins. These pins must be tied together at the part as close as possible, and should be decoupled using 1000pF capacitors.

RF+ (Pin 2): Positive RF Input Pin.

RF– (Pin 3): Negative RF Input Pin.

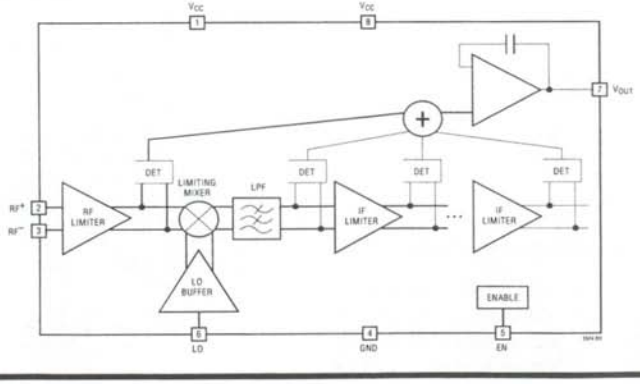
GND (Pin 4): Ground Pin.

EN (Pin 5): Enable Pin. The on/off threshold voltage is about $V_{CC}/2$. When the input voltage is higher than $0.6 \bullet V_{CC}$, the circuit is completely turned on. When the input voltage is less than $0.4 \bullet V_{CC}$, the circuit is turned off.

LO (Pin 6): Local Oscillator Input Pin.

V_{OUT} (Pin 7): Output Pin.

BLOCK DIAGRAM



5504i

LINEAR TECHNOLOGY

Der LT 5504 ist ein "Messempfänger" (800 MHz bis 2,7 GHz), dessen RSSI-Ausgang einen Dynamikbereich von 80 dB auffweist.

APPLICATIONS INFORMATION

The LT5504 consists of the following sections: RF/IF limiters, limiting mixer, RF/IF detectors, LO buffer amplifier, 3rd-order integrated low pass filter (LPF), output interface and bias circuitry.

An RF signal ranging from 800MHz to 2.7GHz is detected by the RF and IF detectors using a proprietary technique. The down-converted IF signal is band limited by the on-chip LPF, reducing broadband noise, and thus an ultrawide dynamic range signal can be measured. The RF measuring receiver is essentially a logarithmic voltage detector. The measured output voltage is directly proportional to the RF signal voltage. An internal temperature compensation circuit results in a highly temperature-stable output voltage.

RF Limiter

The differential input impedance of the RF limiter is shown in Figure 1. A 1:1 input transformer can be used to achieve 50Ω broadband matching with an 82Ω shunt resistor (R1) at the inputs as shown in Figure 5.

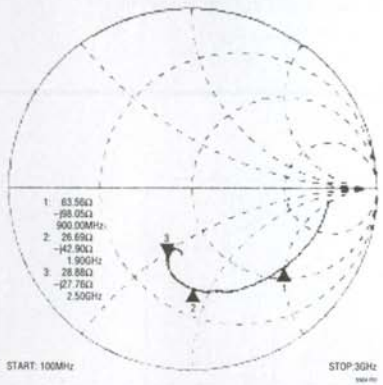


Figure 1. Differential RF Input Impedance

The 1:1 RF input transformer can also be replaced with a narrow band single-ended-to-differential conversion circuit using three discrete elements as shown in Figure 2. Their nominal values are listed in Table 1. Due to the parasitics of the PCB, these values may require adjustment.

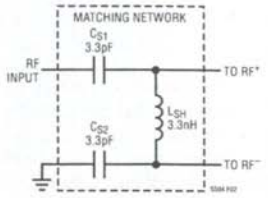


Figure 2. RF Input Matching Network at 1900MHz

Figure 3 shows the output voltage vs RF input power response for these two input terminations. The voltage gain of the single-ended-to-differential conversion circuit is:

$$GAIN = 20 \bullet LOG\sqrt{\frac{R_{IN}}{50}} = 3dB,$$

where R_{IN} = 100Ω is the narrow band input impedance.

Thus, the output voltage curve in this case is shifted to the left by about 3dB.

Table 1. The Component Values of Matching Network L_{SH}, C_{S1} and C_{S2}

f_{IF} (MHz)	L_{SH}(nH)	C_{S1}/C_{S2}(pF)
900	12.0	3.9
1900	3.3	3.3
2500	2.7	2.2
2700	2.4	1.5

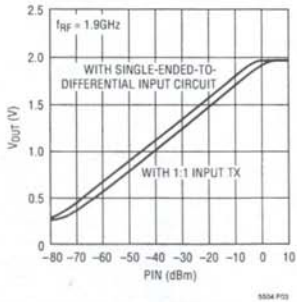


Figure 3. The Output Voltage vs RF Input Power

APPLICATIONS INFORMATION

Limiting Mixer and LPF

The amplified RF signal is down-converted using the limiting mixer and LO signal. The resulting signal is filtered by the 3rd-order, 450MHz, integrated low pass filter (LPF). Only the desired IF signal is passed to the IF limiters for further detection. Any other mixing products, including LO feedthrough, are much reduced to maximize sensitivity. The receiver's sensitivity is thus defined by the LPF bandwidth.

IF Limiter

The IF signal is then amplified through the multiple limiter stages for further signal detection. All DC offsets, including LO signal self-mixing, are eliminated by an internal DC offset cancellation circuit. Nevertheless, care should be taken in component placement and in PCB layout to minimize LO coupling to the RF port.

Output Interface

The output interface of the LT5504 is shown in Figure 4. The output currents from the RF and IF detectors are summed and converted into an output voltage, V_{OUT}. The maximum charging current available to the output load is about 400μA. An internal compensation capacitor C_C is used to guarantee stable operation for a large capacitive output load. The slew rate is 80V/μs and the small signal output bandwidth is approximately 5MHz when the output is resistively terminated. When the output is loaded with a large capacitor C_L, the slew rate is limited to $400\mu A/C_L$. For example, the slew rate is reduced to 4V/μs when C_L = 100pF.

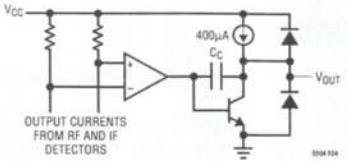


Figure 4. Simplified Circuit Schematic of the Output Interface

Applications

The LT5504 can be used as a self-standing signal strength-measuring receiver (RSSI) for a wide range of input signals from –75dBm to +5dBm, for frequencies from 800MHz to 2.7GHz.

The LT5504 can be used as a demodulator for AM and ASK modulated signals,with data rates up to 5MHz. Depending on specific application needs, the RSSI output can be split into two branches, providing AC coupled data output, and DC coupled, RSSI output for signal strength measurements and AGC. Refer to Figure 5.

The LT5504 can also be used as a wide range RF power detector for transmit power control.

TYPICAL APPLICATIONS

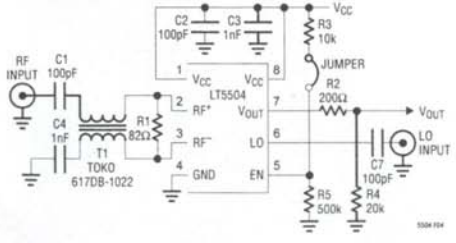


Figure 5. LT5504 Evaluation Board Circuit Schematic

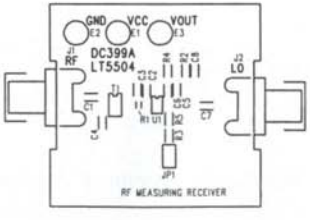


Figure 6.Component Side Silkscreen of Evaluation Board

INITIAL RELEASE
Final Electrical Specifications

LTC5507

100kHz to 1GHz RF Power Detector

May 2002

FEATURES

- **Temperature Compensated Internal Schottky Diode RF Detector**
- **Wide Input Power Range: –34dBm to 14dBm**
- **Ultra Wide Input Frequency Range: 100kHz to 1000MHz**
- **Buffered Output**
- **Wide V_{CC} Range of 2.7V to 6V**
- Low Operating Current: 550µA
- Low Shutdown Current: <2µA
- Low Profile (1mm) ThinSOT™ Package

APPLICATIONS

- Wireless Transceivers
- Wireless and Cable Infrastructure
- RF Power Alarm
- Envelope Detector

DESCRIPTION

The LTC®5507 is an RF power detector for applications operating from 100kHz to 1000MHz. The input frequency range is determined by an external capacitor. A temperature-compensated Schottky diode peak detector and buffer amplifier are combined in a small 6-pin ThinSOT package.

The RF input voltage is peak detected using an on-chip Schottky diode and external capacitor. The detected voltage is buffered and supplied to the V_{OUT} pin. A power saving shutdown mode reduces supply current to less than 2µA.

TYPICAL APPLICATION

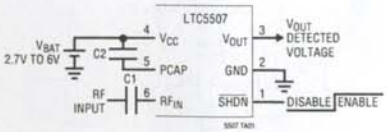
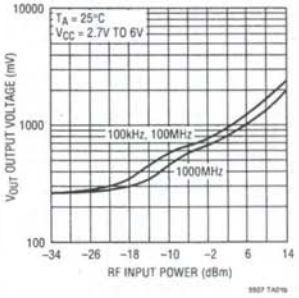


Figure 1. 100kHz to 1000MHz RF Power Detector

Typical Detector Characteristics at 100kHz, 100MHz and 1000MHz



5507i

Der LT 5507 ist ein breitbandiger Detektor (temperaturkompensierte Schottkydiodengleichrichter, 100 kHz bis 1 GHz) wahrscheinlich für den Einsatz zur Leistungskontrolle und -regelung in GSM-Handys entwickelt.

PIN FUNCTIONS

$\overline{SHDN}$ (Pin 1): Shutdown Input. A logic low or no-connect on the $\overline{SHDN}$ pin places the part in shutdown mode. A logic high enables the part. $\overline{SHDN}$ has an internal 150k pull down resistor to ensure that the part is in shutdown when the enable driver is in a tri-state condition.

GND (Pin 2): System Ground.

V_{OUT} (Pin 3): Buffered and Level Shifted Detector Output Voltage.

V_{CC} (Pin 4): Power Supply Voltage, 2.7V to 6V. V_{CC} should be bypassed with 0.1µF and 100pF ceramic capacitors.

PCAP (Pin 5): Peak Detector Hold Capacitor. Capacitor value is dependent on RF frequency. Capacitor must be connected between PCAP and V_{CC}.

RF_{IN} (Pin 6): RF Input Voltage. Referenced to V_{CC}. A coupling capacitor must be used to connect to the RF signal source. The frequency range is 100kHz to 1000MHz. This pin has an internal 250Ω termination and an internal Schottky diode detector.

BLOCK DIAGRAM

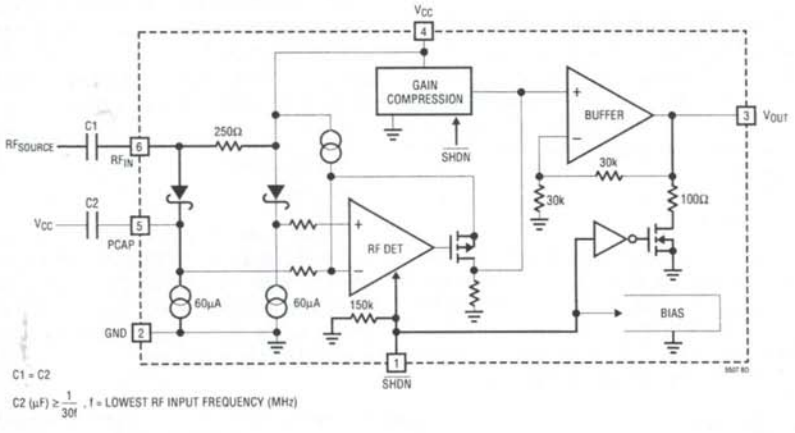
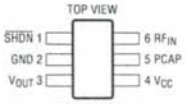


Figure 2.



S6 PACKAGE
6-LEAD PLASTIC SOT-23

T_{JMAX} = 125°C, θ_{JA} = 250°C/W

APPLICATIONS INFORMATION

Operation

The LTC5507 integrates several functions to provide RF power detection over frequencies up to 1000MHz. These functions include an internally compensated buffer amplifier, an RF Schottky diode peak detector and level shift amplifier to convert the RF signal to DC, a delay circuit to avoid voltage transients at V_{OUT} when coming out of shutdown, and a gain compression circuit to extend the detector dynamic range.

Buffer Amplifier

The buffer amplifier has a gain of two and is capable of driving a 2mA load. The buffer amplifier typically has an output voltage range of 0.25V to V_{CC} – 0.1V.

RF Detector

The internal RF Schottky diode peak detector and level shift amplifier converts the RF input signal to a low frequency signal. The frequency range of the RF pin is typically up to 1000MHz. The detector demonstrates excellent operation over a wide range of input power. The Schottky detector is biased at about 70µA. The hold capacitor is external.

Gain Compression

The gain compression circuit changes the feedback ratio as the RF peak-detected input voltage increases above 60mV. Below 60mV, the DC voltage gain from the peak detector to the buffer output is 4. Above 140mV, the DC voltage gain is reduced to 0.75. The compression expands the low power detector range due to higher gain.

Modes of Operation

MODE	$\overline{SHDN}$	OPERATION
Shutdown	Low	Disabled
Enable	High	Power Detect

Applications

The LTC5507 can be used as a self-standing signal strength measuring receiver for a wide range of input signals from –34dBm to 14dBm for frequencies up to 1000MHz.

The LTC5507 can be used as a demodulator for AM and ASK modulated signals with data rates up to 1.5MHz. Depending on specific application needs, the RSSI output can be split into two branches, providing AC-coupled data (or audio) output and DC-coupled, RSSI output for signal strength measurements and AGC.

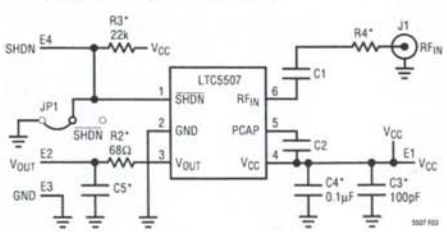
C1, C2 Capacitor Selection (Refer to Figure 3)

C1 couples the RF input signal to the detector input RF_{IN} which is referenced to V_{CC}. C2 is the peak detector capacitor connected between PCAP and V_{CC}. The value of C2 will affect the slew rate and bandwidth. Typically C1 can equal C2. Ceramic capacitors are recommended for C1 and C2. The values for C1 and C2 are dependent on the operating RF frequency. The capacitive reactance should be less than 5Ω to minimize ripple on C2.

$C2(\mu F) \geq 1/(30 \bullet f)$ where f is the lowest RF input frequency (MHz)

$C1 = C2$

In general, select C1 and C2 large enough to pass the lowest expected RF signal frequency, as described by the above formulas. But optimize C1 and C2, subject to this constraint, to improve output slew rate and bandwidth, and to enable good AC performance for the highest expected RF signal frequency.



* OPTIONAL COMPONENTS
R2 AND C5 FORM AN OPTIONAL OUTPUT LOWPASS FILTER.
R3 IS USED FOR DEMO PURPOSES ONLY, AND IS NOT USED IN ACTUAL PRODUCT IMPLEMENTATION.
R4 CAN BE USED FOR INPUT POWER LIMITING OR BROADBAND IMPEDANCE MATCHING.
C3 AND C4 ARE OPTIONAL POWER SUPPLY FILTERS.

Figure 3. Evaluation Demo Board Schematic

INITIAL RELEASE
Final Electrical Specifications

LTC5505-1/LTC5505-2

RF Power Detector with Buffered Output and >40dB Dynamic Range

October 2001

FEATURES

- **Internal Schottky Diode RF Detector with Two Power Ranges:**
  LTC5505-1, –28dBm to 18dBm
  LTC5505-2, –32dBm to 12dBm
- **Wide Input Frequency Range: 300MHz to 3GHz**
- **Temperature Compensated**
- **Buffered Detector Output**
- **Wide V_{CC} Range of 2.7V to 6V Allows Direct Connection to Battery**
- Low Operating Current: 0.5mA
- Low Shutdown Current: <2µA
- Low Profile (1mm) ThinSOT™ Package

APPLICATIONS

- Multimode Mobile Phone Products
- PCS Devices
- Wireless Data Modems
- Wireless and Cable Infrastructure
- RF Power Alarm
- Envelope Detector

DESCRIPTION

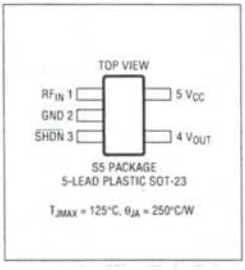
The LTC®5505-X is an RF power detector for RF applications operating in the 300MHz to 3GHz range. A temperature compensated Schottky diode peak detector and buffer amplifier are combined in a small 5-pin ThinSOT package. The supply voltage range is optimized for operation from a single lithium-ion cell or 3xNiMH.

The RF input voltage is peak detected using an on-chip Schottky diode. The detected voltage is buffered and supplied to the V_{OUT} pin. A power saving shutdown mode reduces supply current to less than 2µA.

The LTC5505-1 operates with input power levels from –28dBm to 18dBm. The LTC5505-2 operates with input power levels from –32dBm to 12dBm.

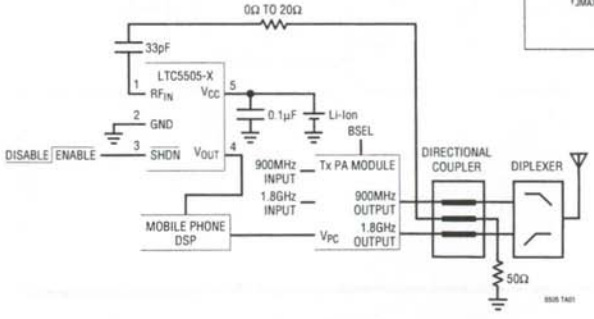
ORDER PART NUMBER

LTC5505-1ES5
LTC5505-2ES5



TYPICAL APPLICATION

Dual Band Mobile Phone Tx Power Control



Ein weiterer breitbandiger Detektor ist der LT 5505 (300 MHz bis 3 GHz).

PIN FUNCTIONS

RF_{IN} (Pin 1): RF Feedback Voltage from the Directional Coupler. Referenced to V_{CC}. A coupling capacitor of 33pF must be used to connect to the ground referenced directional coupler. The frequency range is 300MHz to 3GHz. This pin has an internal 250Ω termination, an internal Schottky diode detector and peak detector capacitor. (See Note 6 in the Electrical Characteristics.)

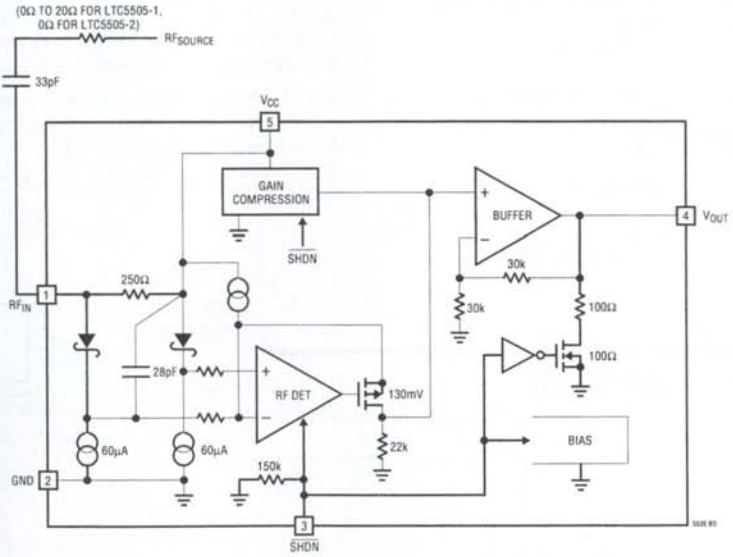
GND (Pin 2): System Ground.

$\overline{SHDN}$ (Pin 3): Shutdown Input. A logic low on the $\overline{SHDN}$ pin places the part in shutdown mode. A logic high enables the part. $\overline{SHDN}$ has an internal 150k pull down resistor to ensure that the part is in shutdown when the drivers are in a tri-state condition.

V_{OUT} (Pin 4): Buffered and Level Shifted Detector Output Voltage.

V_{CC} (Pin 5): Power Supply Voltage, 2.7V to 6V. V_{CC} should be bypassed with 0.1µF and 100pF ceramic capacitors.

BLOCK DIAGRAM



APPLICATIONS INFORMATION

Operation

The LTC5505-X RF detector integrates several functions to provide RF power detection over frequencies ranging from 300MHz to 3GHz. These functions include an internally compensated buffer amplifier, an RF Schottky diode peak detector and level shift amplifier to convert the RF feedback signal to DC, a delay circuit to avoid voltage transients at V_{OUT} when coming out of shutdown and a gain compression circuit to extend the detector dynamic range.

Buffer Amplifier

The buffer amplifier has a gain of two and is capable of driving a 2mA load. The buffer amplifier typically has an output voltage range of 0.25V to 1.75V.

RF Detector

The internal RF Schottky diode peak detector and level shift amplifier converts the RF input signal to a low frequency signal. The RF pin input resistance is typically 250Ω and the frequency range of this pin is 300MHz to 3GHz. The detector demonstrates excellent efficiency and linearity over a wide range of input power. The Schottky detector is biased at about 60µA and drives a peak detector capacitor of 28pF.

Gain Compression

The gain compression circuit changes the feedback ratio as the RF peak-detected input voltage increases above 100mV. Below 100mV, the voltage gain from the peak detector to the buffer output is 1.5. Above 200mV, the voltage gain is reduced to 0.7. The compression expands the low power detector range due to higher gain.

Modes of Operation

MODE	$\overline{SHDN}$	OPERATION
Shutdown	Low	Disabled
Enable	High	Power Detect

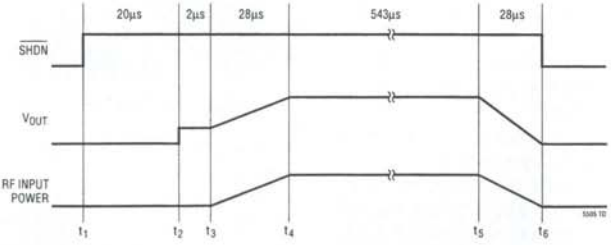
Applications

The LTC5505-1 and LTC5505-2 can be used as self-standing signal strength measuring receivers for a wide range of input signals from –32dBm to 18dBm for frequencies from 300MHz to 3GHz.

The LTC5505-1 and LTC5505-2 can be used as demodulators for AM and ASK modulated signals with data rates up to 5MHz. Depending on specific application needs, the RSSI output can be split into two branches, providing AC-coupled data (or audio) output and DC-coupled, RSSI output for signal strength measurements and AGC.

For the LTC5505-1, a resistor in the range of 0Ω to 20Ω can be placed in series with the RF input to shift the operating range to higher power. A resistor of 20Ω is required for GSM/DCS mobile phone Tx power control, in conjunction with a dual directional coupler at the Tx PA outputs.

Example of LTC5505-X GSM/DCS Power Control Timing Diagram



t_1: PART COMES OUT OF SHUTDOWN 20µs MAXIMUM PRIOR TO BURST.
t_2: CIRCUITS POWER UP AND SETTLE.
t_3: BASEBAND CONTROLLER STARTS RF POWER RAMP UP AT 22µs AFTER $\overline{SHDN}$ IS ASSERTED HIGH.
t_4: BASEBAND CONTROLLER COMPLETES RAMP UP.
t_5: BASEBAND CONTROLLER STARTS RF POWER RAMP DOWN AT END OF BURST.
t_6: LTC5505-X RETURNS TO SHUTDOWN MODE BETWEEN BURSTS

Microwave Europe

Editor: Simon Lewis, GM4PLM

Hello and welcome to another Microwave Europe,

Lyn and I visited the Martlesham Heath Microwave Roundtable that was held at the BT Adastral Labs near Ipswich in November last year. These events have been running for many years but get little publicity in the mainstream amateur press. That is a shame because the events are very popular with the UK microwave fraternity and offer an excellent opportunity to meet with other like minded individuals and use the wide range of test equipment available at each event.

Regards, Simon
Items for inclusion to: Simon Lewis gm4plm@emn.org.uk or via snailmail: Creoch Farm, Ochiltree, Ayrshire KA18 2QH Scotland UK.

Martlesham Heath Round Table November 2002

So just what is a 'roundtable' event?? The microwave roundtables were organised to provide a central meeting point primarily so that people could get access to test equipment that most normal amateurs could not get to. This is still the case today and most of the roundtables have a wide range of test equipment available that allows testing right up into the millimetric bands. This is still an important task as most of us do not have access to test gear that works at 76 GHz! The other advantages of the roundtables is that it brings together liked minded souls from across the country to discuss microwave matters and I can assure you after walking round at Martlesham this weekend there was a great range of discussions ongoing all day. Combined with a lecture programme and small trade show, they are certainly worth a visit. So it was with this in mind my XYL and I decided to invade G land for the weekend and pay a long overdue visit to the Martlesham event.

Martlesham kicked off this year on the Saturday afternoon with an arranged visit to the RAF Air Defence Radar Museum at RAF Neatishead near Norwich.

The museum tells the story of the development of Radar from the Second World War, and includes exhibits of an original WW2 Chain Home transmitter, the development of the Magnetron, and full scale exhibits of the control rooms used until recently for UK air defence. For those of you with QRO ambitions keep an eye open for the 5MW Klystrons, and pictures of the radome at Fylingdales catching fire. Those who took the trip reported it to be very worthwhile and very interesting.

We arrived at Martlesham around 1730 after travelling down via York and a visit to an Equestrian Emporium (which pleased Lyn, my XYL – 2M1EJK, although we are both keen riders). The Saturday evening kicked off with an excellent meal at the hotel that had been booked for the travellers and revellers, and radio conversations were well underway by the time we had down the first pre-dinner drinks! There was already a dedicated crowd in the bar just after 6pm The meal was delicious and the highlight was watching a few of the UK microwave fraternity having to carve the 3 enormous joints of roast beef for the rest of the visitors – it is a tradition, we were informed! With food out the way the conversations continued until the small hours and for me, this was a very enjoyable evening. What could be better than great food, a good drink and a whole room of microwavers!

With an early breakfast out of the way, I travelled with Mike G3LYP along to the Martlesham labs, leaving Lyn to go riding for the day even though it was already raining heavily when we headed down for breakfast. Although we arrived just after 9am, the trade show was already in full swing with a vast assortment of SHF goodies available on the tables.

Sam G4DDK was busy with the UK Microwave Group sales and doing brisk business with his wares. Purchasers from him found themselves clutching a DB6NT shopping bag with some nice goodies in it – very useful for those little items one always collects at rallies! The South Birmingham Radio Society seemed to doing well with a good crowd round their stand, as did GH Electronics. There was plenty of gear for sale and with the number of cheap 20 watt PA's for 3400 MHz sold at this event, I would hope to see a huge burst of activity on that band next summer!

Sam G4DDK doing brisk business

The famous test equipment area kicked off almost immediately with Jason Flynn G7OCD and John Quarmby G3XDY being kept busy for most of the day. Test gear stretched well into the millimetric bands and included some fine examples of modern spectrum analysers, GPS locked frequency counters and noise figure measuring equipment, all of which was enough to make you drool. Peter G3LTF arrived with a whole box of preamps for test and a crowd gathered watching the results as the pile was progressed through.

A super low L band preamp was tested for DB6NT and that had an amazing noise figure of 0.3 dB. Modern devices are getting better by the day! The test equipment was still going well at 1630 when I left for Scotland and certainly a highlight of the event.

The moonbouncers test their preamps – Simon G3LQR (far right), Peter G3LTF (second from left) & John G3XDY (driving the test gear)

Paul Wade W1GHZ delivering his excellent lecture on microwave antenna feeds

Mike G3LYP testing his wonderful homemade 13cms horns

The day also had a fine lecture programme included and these were kicked off at 1100 by Chris GW4DGU, with a talk on Crystal Oscillator Design. The other lectures include talks on components and discussions on the UK microwave contest calendar. The highlight of the lecture programme for me was the excellent talk on Microwave Antennas by Paul Wade W1GHZ, who was this year's special guest, and whose company I'd had the pleasure of at dinner the previous evening. Paul's talk included some fine animated diagrams of antenna feeds delivered in his own inimitable style. This one is a must not miss if you get the chance again. Thanks for a most interesting lecture. Paul also presented Ian White G3SEK, with the 2002 Thomas Kirby Memorial Trophy, awarded by the Eastern VHF/UHF Society in the US, for outstanding technical achievement at VHF/UHF. This was accepted on his behalf by Sam G4DDK.

Lyn, my XYL, re-appeared around 1400 looking decidedly soggy round the edges having been out riding in the dreadful weather for most of the day! And she calls radio amateurs mad! She reminds the OM's that there are plenty of activities around Martlesham for the better half's and indeed it was good to see a few wives braving the elements and joining the activities.

Although activity inside the labs was brisk, the awful weather did not assist the antenna testing range setup on the car park at the back of the building, but it did dry up enough mid-afternoon for a quick session run by Sam G4DDK. A few hardy souls braved the wind and cold to test some antennas but it was not long before the rain returned and everyone returned indoors. This is another excellent part of the Martlesham roundtable events and very useful to test new feeds or antennas using a known and calibrated RF source.

The Antenna Testing Range

The activities and discussions continued for all of the afternoon and was still in full swing when I decided to take my leave and head for home, as the weather was so poor and we had a long drive ahead of us. We finally arrived home at 2330 after a fairly uneventful trip back North of the Border, having enjoyed a very pleasant weekend.

Microwave Europe's Editor Simon, GM4PLM with Paul Wade, W1GHZ (right)

I have to say that it was a thoroughly enjoyable weekend despite the weather, and good to see so many of the names, callsigns and faces linked together. The whole weekend was well organised and delivered. On behalf of all that attended I would like to offer thanks for all the hard work that went into planning this successful event. Particular praise must go to the Martlesham Radio Society for their continued support of this prime event, Paul Wade W1GHZ, Jason Flynn G7OCD, John Quarmby G3XDY, Sam Jewell G4DDK (&XYL) and all of the refreshments crew, for their stirling work. Thanks to the RSGB's Microwave Committee and BT for their continued support for such an important date in the UK microwave calendar.

These are more roundtable events coming this year and continue to be very popular and you would be mad to miss them, keep eye on this column for news of upcoming events and make sure you book early to avoid disappointment. ---

USA 9cm Record Broken and 145 GHz VUCC Awarded

With a new 3.4 GHz record in the US over the past few weeks and a first 145 GHz VUCC awarded things have been busy on the opposite side of the pond! Congratulations to all involved – the envelope keeps getting pushed! In particular well done to that ex-G microwaver, Dave Robinson WW2R, who keeps showing them how its done EU style!

New Microwave Internet Reflector

A new group dedicated to the amateur radio bands 1 GHz and up for UK/EU Microwavers has been established on Yahoo. The group is open to discussions on all modes/bands i.e not just narrowband terrestrial modes. Please feel free to pop in and say hello! You can join online at:

http://groups.yahoo.com/group/ukmicrowaves/ or by sending an email to:

ukmicrowaves-subscribe@yahoogroups.com

Business on the site has been good so far and very useful in sorting problems and letting everyone know about that surplus kit!

Beacon News

The 10368.860 MHz **F5XAD** beacon constructed by F2SF is now located at 2400m asl JN12BL (Pyrénées mountains) with 2w eirp, the takeoff is very good from 340 to 65 degrees (the 432.978 MHz beacon at same location has been heard from G and DL). Might be the highest 3cm beacon in Europe? Thanks for any report at : balises@ref-union.org Michel F6HTJ

The **GB3MCB** 1296MHz (1296.8599) beacon located near St Austell in Cornwall, is off the air following the theft of equipment at the transmitter site. It is not known when the beacon service will be resumed. If anyone has any information on the theft, please contact the repeater keeper, Mr J W Birkbeck, G3IGV, whose address is correct in the RSGB Yearbook.

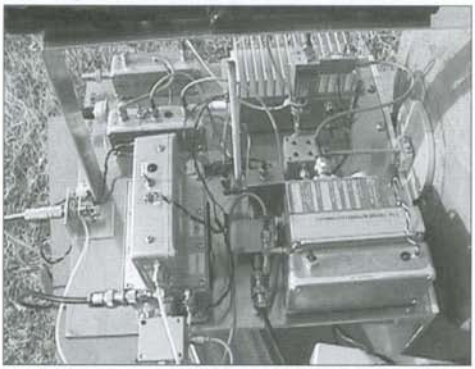
Microwave USA

Editor: Kent Britain, WA5VJB

New World Record on 145 GHz

We have certainly had a lot of microwave activity in the US over the last few months.

First is a new North American and World 145 GHz record of 79.6 Km by WA1ZMS/4 (EM96wx) breaking the old record of 61.7 Km. Weather at the time of the Jan. 12th FSK-CW-QSO was -1.5 C with a Humidity of 26%. Calculated atmospheric loss was 15.4 dB for the path.



WA1ZMS's 145 GHz station

Signals were 2 dB out of the noise at ZMS and 6 dB out of the noise at the W2SZ/4 (FM07fm) end.

WA1ZMS's 5 QSL cards for VUCC

The difference being a better mixer that the SZ end. The QSO was also the 5th grid Brian had worked earning him the first 145 GHz VUCC award every issued by the ARRL. An award this author had the honor of certifying.

Out in California, W0EOM has pushed his 145 GHz system to 25 Km.

Breaking the North American Over Land 9 cm record one km at a time.

February 3th brought an unusual winter high pressure area over the Gulf of Mexio.

After numberous 1500+ km QSO's on 222, 432, 902, 1296, and 2304 MHz. W5LUA in Texas worked WA8TTM/4 in Florida on 9cm. This EM13QC-EL98DP QSO of 1508 km broke LUA's old record with KQ4PI of 1507 km! WW2R/5 (G4FRE when he's in the UK) tailended Al also working TTM extending the 9cm record to 1509 km! (EM13QD-EL98DP) W5LUA was running 240 watts into a 1.8M dish. WW2R was running 5 watts into a 1 M dish. Numerous attempts on 3cm during this opening did not produce any QSO's.

Brian, WA1ZMS

Microwave Update 2003

I would also like to invite everyone to the 2003 Microwave Update conferece hosted by NU7Z this September 25th through 28th in Seattle, Washington. I will have more details on the Microwave Update Conference in the next column.

WA5VJB@FLASH.NET

2m-EME News

Editor: Heinz Borde, DM2BHG
e-mail: heinz.borde@t-online.de

- **Around 2-m-EME**
- **Skeds in CW-EME code versus digital mode**
- **News and information's**
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Around 2-m-EME

December 2002 / January 2003

IK2DDR: Hello moon friends, i want just inform you that last night, I found extremely fantastic eme conditions. I can compare this situation with January 02, 2002.
I started my random activity, as usual on 144.043, around 21:50 UT. Here the list of stations worked till my QRT for bed, around 02:00 UT

Date	time	station	reports	max.sig. level	
17-01	21:51	SM2CEW	O/RO	18 DB S/N	RANDOM
17-01	21:57	F3VS	O/RO (539/549)	22 DB S/N	Random
17-01	22:05	F8DO	O/RO	8 DB S/N	RANDOM
17-01	22:13	PA0JMV	O/RO	15 DB S/N	RANDOM
17-01	22:27	DL5MAE	O/RO	12 DB S/N	RANDOM
17-01	23:15	YU1IO	O/RO	8 DB S/N	RANDOM
17-01	23:25	PA3CWI	O/RO	10 DB S/N	RANDOM
18-01	00:14	K9MRI	O/RO	18 DB S/N	RANDOM
18-01	00:35	N5BLZ	O/RO	17 DB S/N	RANDOM
18-01	01:00	N1KI	RO/O	12 DB S/N	SKED (new State)

(thank you Phil, i'm hunting Tennessee by long and long time, now i need only 9 States).
So lot of activity. I was surprised by the very low noise and the extremely stable own echo. I heard it till 19 db s/n, really a great fun for me.

W0VD: I have not been active on EME for quite a while now. Over the weekend I downloaded the new version of JT44. So I had to try it out. I was really surprized as to how well it works. Stations worked:
OH7PI random JT44 loud signals very easy to work.
K7YVZ random JT44 loud signals he was having trouble hearing me. New state on EME for me.
S52LM random JT44 loud signals very easy to work.
N9LR sked off the EME logger. JT44 easy to work on my moon rise.
SP2OFW sked JT44 loud signals. New country for me #44 on 2 meters.
YO4FRJ sked CW very loud signal, easy to work.
F8DO sked CW no copy on this end. F8DO said I had very loud signal on that end. I had no copy with either Vertical or Horz polarity. I guess one way propagation?
PA0JMV sked JT44 loud signals very easy to work. Took less than 5 minutes.
Heard DK8JZ JT44 calling CQ very loud signal. Never heard me calling him. Gave up after 20 minutes calling him so went to bed HIHI.

KJ9I (EN53) worked a new DXCC: On 15 Dec, 2002, I was successful working HL1/ON4MU using JT44. He runs only 2 x yagis and approx. 200 watts from a very noisy urban environment in the city of Seoul.

K6PF, DM13, completed with F8DO (4 x 11 ele, 1.5KW), after 47 prior tries during the last 1.5 years on 2m using normal CW on January 18th.

RA4AOR reports the following skeds: 1. F8DO; UA3MBJ; UY5HF -NIL;
2. S53J - NIL but heard JT-44 on freq.! QRM?
3. WA4NJP - NIL, but before heard random QSO WA4NJP/N5BLZ.
4. K6PF & W7MEM: lot of apologies, have overslept.
Rig by RA4AOR: home made tr-r (not digital synthsizer).

AL7EB: 19/1/2003 was a good night:
Started monitoring JT-44 logger about 0415, copying stations on 144.123, heard and called G4FDX.
First sked was PA0JMV, moved to 144.119 and worked Joop at 0510 Rx-H, Tx-V [JT-44 #3]
Called by G4FDX/W9 on .119 at 0515 but he was unable to copy me.
Called by W0HP 0543 Rx-V, Tx-H Rx-V, Tx-H/V ...could not copy me.
NL5BLZ at 0625 on 144.122 Rx-V, Tx-V [JT-44 #4]
ES6RQ at 0648 on 144.143 Rx-H, Tx-V [JT-44 #5]
AA7A at 0700 on .143 Rx-V, Tx-V [JT-44 #6]
W0PT at 0727 on .143 Rx-V, Tx-V [JT-44 #7]
called CQ at 0751 on .143, answered by PA2DWH running a single 10-element beam at 4-deg fixed elevation and 1.5 kW rough copy but had both calls but he could not get my O's... He ran out of Moon after 0830. Polarity started out Vertical then moved to Horz. Then called by K7YVZ on .143 Rx-V tried both pol for Tx but he did not hear me.

W0PT: I have found 2m EME conditions to be quite good these past days. I am now on JT44 in addition to CW. This week I have worked the following new ones.
N1KI CW #265
SP2OWF CW #266
YO4FRJ CW #267
UA9SL CW #268
DK5LA JT44 #269
AL7EB JT44 #270

SM2BYA 144 MHz weekend activity report:
10 QSOs - UA4AQL, W7MEM (sked), K6PF x 2 (sked), I2FAK x 2, IK1FJI, JH2COZ, OK1MS, SP2OFW (random # 97). Heard many others. All in ostrich mode.
Am really happy for Bob's (K6PF) sake. He has been trying very hard to get through to me with his 425 watts for almost

two years now, but every sked so far has been wiped out by local noise sources in my Californian window. In spite of this he has stuck with it, and this weekend we actually completed twice ! Way to go Bob!

LU6KK results: UT5ER cancelled W0PT missed
UA4AQL RX only few sequ. Not completed.
DK3WG O/O very nice signal RW3FG NIL
I have now 50# initials with my 2 x 15el Dj9bv and 2x4cx250b, all on CW only. I hope can work JT44 soon, don`t have any pc in my shack right now. Photos of my small station are on www.lu6kk.8k.com, photos section.

PA0JMV: Another great lunar night/morning on 2m EME has set at the horizon. There is NO need to have big arrays and power when conditions are like we had today.
Worked Dec 22-23 with my 2x16 el home made 17.1 dBd array:
2254 utc JL1ZCG very loud on his CQ in JT44
2340 utc IK0BZY easy to copy 1x16 el Xpol I0JXX /700W, my 1-yagi init #19
0121 utc K3TV # 649 very loud at his rise, 4x12el/1k5 no elev, I had to overcome lots of local line noise in his qth. after this QSO I fell asleep at 02.30 AM local time 0454 utc ZS6NK #650 max -27dB calls complete in 2 sequences!! 2x25 el 2M8WL /45 Watts output, my 2-yagi init #60.
0532 utc N9LR #651 also at -27dB and hard to get all complete 4x8el/900W
0540 utc W7FG he called me after N9LR, loud, 12-14dB in 200Hz FFTDSP
0608 utc copied CQ from ZS6WB 1x17el/100W with his ground gain, he copied me but at the moment we could have completed, his moon set...arrgghhh.
0642 utc EA3DXU on his CQ 2x17el/pwr easy qso.
0915 utc own CW echo copied at 14-16dB in 200Hz FFTDSP but that was my ground gain window, heard my own voice back in SSB echo.
The QSO's with IK0BZY and ZS6NK have been made with NO ground gain effects at either side (high elev), so that proves again that 2m EME is well possible with VERY small stations !!!
ZS6NK was using a barefoot IC706MKIIg with NO PA and NO preamp, the output measured at 45W in the shack, I don't know what feedline loss Paul has, but let me assume 0.5dB? 2x2M8WL should give some 19.5dBd... that makes around 3.5KW ERP at most !!!!! This amount of energy could be copied in my small station (17.1dBd ant gain, 0.3dB NF masthead preamp into a home made transverter and TS850) The Antenna and preamp is in use since 1988 and has been moved 2x to other QTH.

W9UWA: Well there certainly has been better EME conditions and more activity in recent weeks. Stations worked:
Dec16 SP2OFW CW, I6BQI JT44 #226
Dec22 W7FG JT44, N5BLZ JT44
Dec 23 W7FG JT44 -12db sn here -27db sn there. I was running 38 watts. Is there anything Gary can't hear?
EA3DXU JT44, PA3CWI CW, N9LR CW #227 Larry has my old 4 x W1JR 8 array and is in EN50 also. I helped him to be QRV. I6BQI JT44
Dec 24 IK1FJI CW, F9HS JT44, KD5HIO JT44 #228
Dec 28 K9KNW JT44, VK2FLR JT44 #229, JL1ZCG JT44
Jan 18 KL7X CW, KD3UY JT44 #230
Jan 19 K7YVZ CW DN13 Contest QSO with grid exchange. OK1MS CW
Jan 21 S52LM JT44, W0VD JT44, VK2KU JT44 #231

R/U-station Results 1/03 (via DK3WG)

RA3QTT wkd new stn DA0ED (DL5MAE rig)
RW3PF had initials with PA2CHR, W7MEM and UA4AQL.
RW3WR had his second QSO via moon with DK3WG
UA3TCF completed with DF2ZC
RA4AOR was on, no new stn
RN6MT no new stn, high local noise
UA9FAD no new stn
UA9SL had Ant. problems (WX), added OK1VVP.
DK3WG was active random and in skeds, new W0EKZ, W4SW and RW3WR #777, heard full time KN4SM (1 LY).

February 2003

SM2BYA: FINALLY reached my goal of working 100 random initials on 144 EME:
Sat. 2003-02-15 RN6MT # 98, PA0OOM # 99
Sun. 2003-02-16 SK3MF # 100
Thanks to all you gents out there who made it possible !!!
Other QSOs this weekend were IK2DDR, LA9NEA, DK3WG. Failed skeds DD0VF, F8DO, RA4AOR.
Some statistics and other info:
All but one of the 100 were worked in the five year period Feb. 1998 - Feb. 2003. The single most important item which made this possible is undoubtedly my high power PA. This runs an Eimac 3CX1000A7 with a 1969 date code. I bought this tube for USD 50:- almost thirty years ago while still a student at Uppsala University, with the idea in mind to get active on 144 EME rather soon.
This was not to be - Ph.D. studies, a move to Kiruna, new job, family, two kids, building a house took precedence - I kept hanging on to the tube, but it was not until 1997 that I found the time to finally build an amplifier around it. Worked my first EME in 1985 or 1986 (W5UN of course) with 350 watts from a single 4cx350, but was essentially limited to working ten or so big guns until the 3CX1000 put out its first RF in February 1998. The tube now has 810 hours of filament time on it (I believe it was NOS when I got it). Guess I've spent about 500 of those hours in front of the rig, or on the average two hours a week for five years. Average, above or below for this community ? Would be interesting to learn about others' experience...

IK2DDR:here the list of stations worked :
15.Feb: F1FLA, OZ1HNE, UR5LX, HB9Q, SV1BTR
16-Feb: PA0OOM #436, SM2BYA, KB8RQ. PA3CMC, RN6MT
All QSOs were done on random. As on previous month, i found good activity and extremely excellent conditions, with low noise and strong signals. It seemed that all stations were

operating with +3 db power. My own echoes were on my headphone 95% of the time and till, as usual, a maximum of about 20db s/n. About Linrad, i'll say that my actual and my next eme antenna is only "H" pol. and operating with an IC275H, maybe i don't use it for its maximum performance, but also with these RX conditions, it seem to me that Linrad has many reasons for to be used.
Thanks to Graziano, IK3MAC, who helped me to resolve my Linrad tuning.

Skeds in CW-EME versus digital mode (PA0JMV)

It is not often that I reply to threads on this net but today I feel I should do so. I fully understand the sadness and I agree that CW-EME is nearly dead, just like via MS, there is no more HSCW and very little SSB-MS, we have only FSK441.
However, both JT44 and FSK441 now works technically FB!! Big compliment to K1JT !!! (apart from some operator's bad discipline and cluster cheating!! We suffered from that before the WSJT-age as well...) There is nothing in ham radio that is more exciting than decoding the info for a QSO by ears and human brains; it is just like other communications, of course I prefer to talk with my colleagues in QRL and see them, rather than communicate via Email with them; I have no choice, I must email as well.
But we live in the year 2003 and I think there is no way back from new digital techniques. Sometimes that is good, e.g. when I am in a meeting at QRL and should tell the xyl that I will be late for dinner, I rather send an SMS to her than leave the meeting and start a live phone discussion :-))) Why should we stop or even boycot new fascinating technical solutions? I remember 1967-1969, we used to tx in AM and when SSB came up on VHF, only very few adopted it, same with FM modulation some years later. But who knows a real VHF-DX-er who called CQ in AM after 1975? Same with the Maidenhead locator versus the old European QRA-locator. I have a rather small EME station and there was hardly anything new to work for me in CW-EME during the last few years (maybe 20 new inits per year); I asked MANY MANY times for skeds or announced CQ via Moonnet, direct mail, phone, 14.345 etc etc.... every year more difficult to get skeds or work new ones on random. Even I considered quitting EME and play other games.....
When JT44 was introduced and became popular on EME, I tested it and after some frustating experiments (of course I did not read the manual...) I learned how to *really* operate JT44 and squeeze the signals out of the noise (I had to help the PC a lot to decode the weakest sigs, it is *not* working all automatically and it is FUN when the operator is smarter than the softwareroutines !!) Since September 2002 (4 months) I worked 30 new stations off the moon, only 11 new via CW; most of the new ones had just started EME and were *VERY* anxious to try with me, unlike the CW-community. This apogee (DGR -4.9dB) I worked 2 new very small 2-yagi stations with low power, amazing.....
There is one more thing that I must admit however, while operating JT44-EME, I ALWAYS try to find and HEAR the 1270Hz synctone in my headphones, using the same setup as used for CW !!! (FFTDSP to trace and tune, DSP 25 Hz CW filter to listen)
Why this long answer?
Just because I want to invite others to come on the moon and communicate via luna please, no matter what modulation techniques. Please call me either in CW or let's play Scottish bagpipe music (JT44) off the moon. 14 dBd and 100W will make an EME QSO with me possible.
I am getting an OLD ham, 34 years QRV on 144 MHz, 16 years @EME, but JT44/EME is just fascinating me almost as much as I was thrilled by the 1st EME QSO !!!!
PS: I worked stations with ERP as low as 2.2kW via EME, please look on my homepage www.planet.nl/~pa0jmv

News and information

K6PF: Since I have been recently seeing some postings on moon-net from hams wanting to get started on EME & looking for information, thought I would mention the following. Last October, I made a presentation at & had my article published in the Proceedings for the Western States Weak Signal Society's (WSWSS) "Western States VHF/UHF & Microwave Conference".
Since that conference, I updated & made a few changes to that article & Joe Lynch, N6CL, has graciously agreed to publish it in the next
(Winter) edition of CQ-VHF Magazine which will be mailed to subscribers early in February. The article is entitled, "Getting Started On Two Meter EME To Work Lots Of DX". Here is an outline of the topics covered in the article:
1. The Nature of EME - Basic Technical Aspects (polarization, libration fading, doppler effect, sky noise, path loss, degradation, declination, ground gain, moon phases, activity weekends, & best times to operate are covered in this section).
2. What Kind Of Station Is Needed To Work 2m EME? (a minimum station as well as a more advanced station are discussed).
3. Selecting The Best Times To Operate & Setting Up Skeds
4. Operating Procedures For 2m EME
5. Sample FFTDSP Displays (of several different signal strengths)
6. Digital Techniques
7. Conclusions
Also, a lot of references & URL's are included.
I think this will be a good reference for anyone wanting to get started on 2m EME as well as for some of the newer EMEr's. If you're not already a subscriber to CQ-VHF, I hope you will pick up the Winter issue & review my article. Any feedback fm the EME community on it will be appreciated.

HB9DRD/G4KLX: I have uploaded a document to my web pages that outline the development of JT44 TNG (the Next Generation). It is not a particularly technical document, there are no integration signs to be seen, but it does outline the methods that are going to be used to squeeze more performance out of a JT44 like system. JT44 (and indeed JT44

TNG) are only the beginning of really utilising DSP and FEC techniques to move EME forward.

The 11th International EME Conference

will take place in central New Jersey, USA, in August 2004. All radio amateurs interested in moonbounce, or VHF-microwave techniques, are invited to attend.
The Conference is scheduled now for August 6, 7 and 8, 2004. At the same date and location the Int. SETI league conference will take place.
73, Marc N2UO and Al K2UYH
Organizing Committee EME 2004.

ZS6WB: On Friday morning at South African moonset another 144 MHz EME QSO was completed between W5UN and ZS6WB. What sets this one apart from many previous QSOs was the low power and small antenna used on the South African end which truly shows that EME operation is possible for anyone willing to go to the effort and lose some sleep. The output power used at ZS6WB was only 50 watts and the antenna a small 7 element Yagi with a 2.75 metre boom length and a height of only 5 metres above the ground. The JT44 digital mode was used during the contact. W5UN's comment at the end of the QSO was "Congratulations on being the smallest (by far) station ever worked on 2 meter eme".
Dave had previously worked W7MEM on 144 MHz CW EME who was using only 25 watts output with an antenna array of four long Yagis. Taking into account the differences in antenna gain and power W7MEM would have had a loop gain-advantage in excess of 17 db, a huge amount in EME terms and another demonstration of how K1JT with his WSJT software has revolutionized weak signal VHF operation..
The moon was only four days past apogee at a distance of more than 390000 km from earth and the 15600 kilometres per watt covered should certainly qualify this as a good QRP QSO.

Once there was a chat about... (Internet Chats of common interest)

VK3AUU: At this stage it might be enlightening to those of us who are ignorant for someone to tell us, "What is Linrad"?, "What benefit does it give CW operators"?

SM5BSZ answers:
Linrad is a PC program that provides waterfall graphs, spectra and the usual dsp things.
Linrad also has several other dsp functions, click on a signal on the waterfall to get it into the loudspeakers/ headphones.
You can use matched filters (15 to 20 Hz) on weak and unstable signals because Linrad has an AFC that keeps the filter centred
on the right spot based on the power average both forward and backwards in time as the operator requests.
Linrad also provides coherent processing and binaural with different bandwidths to both ears or a time delay. Each of these modes can help in certain situations.
Linrad has a smart noise blanker that will work even with very strong signals within the passband. This even works in SSB bandwidth if the pulse repetition rate is modest. You may hear weak signals that are impossible with the builtin blanker of the SSB rig (but the rig's blanker must be switched off).
If you have a cross yagi with a dual receiver, Linrad will automatically adapt to the polarisation of the incoming wave and eliminate Faraday rotation. It receives circular or any arbitrary polarisation equally well. Linrad has an EME window that shows what will be the best transmit polarisation for you to use based on the location and received polarization of the other station. Linrad reads the usual EME data bases and you can search stations by entering call sign fragments.
Linrad is extremely flexible, it is kind of a dsp toolbox. You may set it up very different tasks. Linrad has no prejudice about what you want to do, it will happily process 2kHz bandwidth from any standard SSB transceiver, just route the audio to your PC soundcard. Because of the flexibility it is possible to mis-use Linrad. I have tried to provide the necessary information but everything is in an early stage.
To process 2kHz bandwidth a Pentium 60MHz is sufficient. For high end usage, X-yagi with 92kHz bandwidth you need a PentiumIII at 600MHz or better. Linrad and its predecessors is the tool I have used on EME since the ARRL contest 1995. The first version was in a TMS320C25 and had 3kHz bandwidth with 250ns memory access.
In the 2000 ARRL contest I used Linrad on a single 2SA13, a cross yagi with a boom length of 8.3 meters with a gain of 14.5dB. I worked 96 qsos with 40 multipliers and despite good QRO, the bottleneck was the tx side. I heard and called many more stations.
It is an advantage to use more bandwidth. With 92kHz on the screen you will be able to monitor nearly everything that goes on in EME CW, particularly if an X-yagi two channel system is used. A large bandwidth is very beneficial to the performance of the noise blanker.
Linrad has spur cancellation, you may place hundreds of very narrow notch filters on narrowband spurs to make them disappear completely. Right now it works only for very stable spurs but it removes them with no effect on a CW signal that happens to be on the same frequency. Only if the carrier of the cw signal coincides with the spur there is a problem.
The Linrad home page is at
http://ham.te.hik.se/~sm5bsz/linuxdsp/linrad.htm
with mirrors at:
http://www.nitehawk.com/sm5bsz/linuxdsp/linrad.htm
and at:
http://www.g7rau.co.uk/sm5bsz/linuxdsp/linrad.htm
There is a very large number of pages that you can reach from Linrad home. There are descriptions on hardware and various things that I encountered while working on this project. Here is the bad news: Linrad means Linux Radio. You have to install Linux in order to use Linrad.
On the other hand, Linrad is free and Linux is free. Some

soundcards may require a drive routine from OSS which means a cost of $65. I hope there will be some reduction for hams soon.

HB9DRD/G4KLX: The DJ9BV series of yagis are designed for use with insulated elements, passing through a metal boom. My question is whether changing the boom from metal to (say) wood would be practical, and would the element lengths remain the same. From what I read I would think that the answer would be yes, but does anyone know for sure ?

W9WBA answers: If the dimentions stated for the DJ9BV yagis are intended for use with insulated elements, then a boom diameter should be specified too and it should be followed as suggested. If the dimentions live in a computer simulation, then generally a boom correction factor is not included in the dimentions and you may be free to place the elements on a boom that does not require a correction factor. The elements are made longer when they are required to pass through a conductive boom and this boom correction factor can not be ignored. You must find out which is the case for your dimentions. From a strength standpoint, aluminum booms have no equal. I am using a hybrid of aluminum and fiberglass boom myself. The fiberglass part is only about 1/2 as strong. I allowed for this in my design. Pictures of my antennas can be found in the Xpol section of the GM4JJJ web site. The element correction factors are dealt with in the free software, YA3.54 that can be downloaded from the SM2CEW web site. I think some DJ9BV designs are even included in the download. The most accurate application of element correction factors are a result of experimentation and a proceedure is well presented on the SM5BSZ web site.

G0RUZ wrote: I am getting my new 6 yagi array ready to put up in the Spring sometime. I have 6 times I0JXX 32 Xpols which means that I will have 12 phasing lines.
Initially I was going to use LDF4-50A for the phasing lines and I have the connectors to do this. I am concerned about the weight and size of this cable and wonder what other people are using. I don't particularly like the aircomm type cables as I have had lots of bad luck with water getting in and also the braid is not particularly good. I had thought of using LMR 400 but is it really good enough? Also the cost of the connectors is extortionate here in the UK. Perhaps someone in the USA could help me with the connectors if this proves to be a viable cable to use. I just think that LDF4-50 is a little bit unwieldy and heavy. Does anyone have any thoughts.

WB9UWA answers: This may be of general interest. I am using both 1/2" hard line and LMR400. Since I already had 1/2" hardline before, I used it on the horizontal side. I added LMR400 to the vertical side. I think my lengths are something like 12 feet each, so yours will likely be longer. I have never consistantly seen any difference in my echos depending on which polarity was used. You can clearly see the difference between the feedlines and how I am using it if you look for my pictures under the Xpol section of the GM4JJJ web site. I am not using connectors at the yagi feeds and the vertical side is less effected by water. In the spring, I will bake the connectors in the hot sun and put heat shrink tubing over the hardline connectors.
If you are using a really good pre-amp, then RX will be dominated almost totally by antenna noise, so a little degradation by the feed line should not matter. If you have good power on TX, then you can afford a little loss on TX as well. If you know the lengths that you need, then you can easily calculate the loss and compare the feedlines. If you consider that you have a maximum limit on weight and windload to hold, then you can easily trade a little between the feedlines and antennas. I think the trade-off will favor LMR400 every time. If you can handle 1/2" hardline, then you probably can handle a larger antenna and LMR400 instead. This is especially true if you consider that any needed support poles for the feedline can be lighter with LMR400 in use. The connectors are the same as that used on 9913 and are relatively (compared to hardline connectors) cheap in the US. Try the brand name, RF Industries, for example. They have a good cost/quality ratio. I would use the LMR400 and put more thought into your overall vertical performance instead, given that you are using 6 yagis. This certainly has to be the difficult part . Of course use at least 7/8" hardline for the main TX feedline, if not 1 5/8. I use 100 feet (about 32 meters) of 7/8". My echos are the same whether I use the pre-amp at the rig or at the array center. Your milage may vary.
This suggest to what extent that antenna noise dominates (at least here).

Treasury INTERNET

www.alltel.net/~wb5apd/ic746.html
Upgrading IC746
www.freewarepage.de/download/155.shmtl
dimension4 computer clock
www.hb9q.ch/database/search.htm
EME toplist
http://www.emecz.cz/ftp/outcoming/cd_eme2002/lect.htm
Lecture LINRAD of SM5BSZ at the Prague EME conference
http://www.qsl.net/g4klx (under Software or under News)
JT44tng
www.nitehawk.com/rasmit/f1ehn.html
F1EHN`s latest version of his free EME software

EME News

Editor: Bernd Wilde, DL7APV

Intro

Due to heavy qrl this time a short column. Activity on 432 is still on a low level. The ssb contest made good activity on 23cm. The discussion about JT44 contra CW seems to be with no end. Both modes have their advantages, but we should never forget the goal: To have as many EME contacts as possible! Or short **HAVE FUN!** Only one question to me has no solution, how to make a "random contact" on JT 44?.

To everyone who is interested in **sponsoring** future **432 MHz expeditions** or will run an expedition. We will try to collect a nearly complete rig: Little Tranceiver, 2 long or 4 short yagis and all needed equipment what can be transported in a "standart" big flight case (for wind surf or ski equipm). Including some tubes, Relais, Preamps, 500w solid state PA cabling a.s.o....
Maybe some budget for traveling costs can be collected as well. The DUBUS Magazine will help too. The goal should be that someone who is able & willing to run an expediton (or take part) will get the equipment and maybe some financal help to do it. For any kind of help and or ideas contact HB9Q or DL7APV (hb9crq@hb9q.ch dl7apv@t-online.de)

432 & up (net) news

DL9KR: worked SM5IOT 559 #774 initial.. 1.2kw 8 I0JXX yagis.6.5l JO99. Jan needs only16 more countries for DXCC on 70cm EME

The 70cm-result from the R/U-stn Jan.:

UA3PTW wkd Random RA3LE (559/549), SM2CEW (569/559), OK2BDQ (549/549), K9KFR (559/559)#118, K9SLQ, W7CI (559/559), K1FO 8569/549, HB9Q (569/539), SP6JLW (559/539) and K5WXN (559/559), he heard LU7DZ (449) and cwn SM5IOT (40 min qrz UA3P).
DK3WG added in sked KL7HFQ #391. RW3PF and W7EME heard me, not complete.
Feb.: RA3LE had initial F/ON5OF and KE2N.
DK3WG worked F/ON5OF and KE2N #393.

S50M is a new one on 432, he will start with 4 x 21 el Tonna and abt. 250 Wout and full elevation. 73 de Janko

SM2CEW: Again excellent conditions were found on both 432 and 1296 in Jan. On 432, I worked OK2BDQ, JA6AHB, UA3PTW (twice), OH1DG, RA3LE, K1FO (2 QSOs - one for the ARRL VHF contest), K9KFR and SM5IOT. Very good signals were observed at all times. The weekend before the SW, I worked G4ALH and K5WXN. On 1296 I was QRV on 11 Jan and worked SM5CFS, F1ANH and F6KHM and then on 19 Jan I worked SM5CFS again, JA6AHB and ZS6AXT. Heard were HB9JAW on Jan 18 with good signals, but I was only listening that day and on the following day Michele was not heard on. It will be our 3rd band on EME when we work on 1296. Also heard was HB9SV with a huge signal. On 432 MHz JT44 I found EA3DXU and DL4KG working each other, excellent signals from both stations.

VK3UM: Feb 15/16 I managed to get on briefly and on the 15th on Moon set worked 1635 VK4AFL 56n 56n H/H (loud!) 1657 RA3LE 54c 55n H/HV (distinctive!) 1704 UA3PTW 55n 56n H/H (good as always) 1717 IN3AGI 54n 44n H/HV (new #267 a long QSO!!) 1752 DF3RU 55n 55n H/H (2 min QSO) heard also SK0CC (53n) and DJ5NV (56n) both H. Conditions appeared quite stable with no libration fading detected. Polarisation changed at about 2 degrees elevation. About 45 degrees of Faraday but excellent alignment with Trevour VK4AFL. Unusual to have H/H into Europe.
16/2/03 Moon rise 0939 JA6AHB 54n 55n H/H . Called for 30 minutes afterwards but no body else on! Libration fading detected and Faraday about 90 degrees.
All QSO's conducted without skeds, without loggers or spotting, with legal authorised power, and in the true dinosaur mode !!!73 de Doug (VK3UM)

23cm

SSB contest:

G4CCH: Unfortunately, tree blockage limits the start of my Moon window to >90 deg Az... this meant starting after 1830, even then 1/2 of the dish was still in the tree and wasn't clear until 2 hours later. Keeping awake in the early hours of Sunday morning was a problem... notice the lack of QSO's between 0100 and 0400, I fell asleep while sat in front of the rig for at least 2 hours! Hopefully, I didn't miss too much. Despite this I still managed to make 27 QSO's with a contest score of ((24x2)+(3x1))x11 = 561 points.
1836 IK2MMB 53/53, 1845 F6CGJ 55/55, 1848 F6KHM 55/55, 1902 HB9Q 56/57, 1916 F2TU 54/54, 1920 I0UGB 53/54, 1930 ZS6AXT 559/55, 1950 HA5SHF 529/55, 1955 HB9BBD 58/58, 2003 GW3XYW 55/55, 2016 DL1YMK 53/55, 2024 LX1DB 58/56, 2032 HB9BHU 54/55, 2034 OZ6OL 55/55, 2155 OE5EYM 55/55, 2246 IK3COJ 529/53, 2319 N2UO 32/32, 0014 OE9XXI 58/55, 0031 W2UHI 55/55, 0037 KU4F 55/56, 0039 K0YW 55/56, 0042 G3LTF 55/55, 0047 K5JL 57/57, 0100 K2UYH 55/56, 0105 W7BBM 52/55, 0017 W5LUA 55/55, 0400 N7AM 54/54 and 0410 K7XQ 539/539. Gotaways were DJ9YW, DF4PV, K9KFR and WA6PY. Many thanks to everyone that made a QSO with me at the weekend 73's Howard - G4CCH 650W, 0.31 NF, 5.4m Dish

HB9Q: We have worked 29 stations in SSB and one in mixed. They were in 10 multipliers. This gives us 580 points. Due to technical problems we lost 3 h at moonrise and due to low activity and very tired operator we went QRT 3h before moonset. We had a great time to talk to all the friends. See at www.hb9q.ch for detailed log. vy 73 es happy moonbouncing Dan, HB9CRQ / KT6Q head of HB9Q

W2DRZ: Tom plans to be active on 23 cm EME. He has been working on Moon Tracking Controller Board that he wants to

share with the EME community. Before the printed circuit board is sent for production, he would appreciate some feedback. The board is designed to use 2 software Programs: F1EHN and NOVA. You should just be able to just start either of these programs and the unit will control antenna EL and AZ.
Tentative specs for the unit are: 1) A/D 10 bits, 2) AB (US DIGITAL) 12 bit sensor, 3) Incremental encoders (quadrature 2 wire) with up to 16 bits depending on the span min to max, 4) Parallel 16 bits - There is a span to set the Min and Max for pots, "analog" and incremental encoders, 5) After installion you set the zero setting and then calibrate the unit to maximum and do a max set of the pots or the incremental encoders - This is stored in the PIC until you have a reason to change, 6) The settings will be there on boot up of the system - Just run the software selected. 7) A zero set for the absolute encoders is included - After installed simply do a zero set of each encoder, 8) An elevation switch setting for 3 conditions (90 deg, 180 deg and 360 deg) will directly interface with the YAESU G5500 rotor using an 8 pin din plug out matched to the YAESU pin alignment used on the control box output. – (Is there a better output arrangement?), 9) Will have a 7 second wait delay of antenna movement - After 1st or last time move if over 7 seconds, bur instant in El or Az each, Will have a shut down of all movement, if no sensor change in 7 seconds, 10) There will be no start of antenna movement until the unit is powered down and back up if no sensor change is detected in 7 seconds - Any shorter and some systems may not be fast enough on sensor to quantify change - This is not intended to be a "safety save for antennas or rotors" but just a feature that will be free to be included as a better mechanical failsafe method should be employed instead , 11) Do not have at present a soft start in the design - How important is this feature?, 12) There is a dilemma of sorts on how much to quantify change before the antenna is moved (big system 0.1 deg, 0.01 deg, or yagi antenna with 2 to 5 deg) - Should there be a switch selectable amount, for example 4 different amounts that can be set by a switch?, and 13) Any other desires with in reason? Comments to: w2drz@madbbs.com

ZS6AXT: Ivo experienced noise problems from a new computer and reports: On 22 Dec I worked on 23 cm JA6AHB, DL1YMK, LX1DB, GW3XYW, IK2MMB and K5JL. At that time I was still running my new 1.3 GHz computer, which was causing very high noise level, as I discovered later. On 11 Jan I worked on 23 cm K5JL, F1ANH, DF4PV, G4CCH and K9KFR. This was still with my new computer running. On 12 Jan, I made moon AZ/EL printouts and switched off the computer. What a difference in reception! I worked OH2DG, F6KHM, DF4PV, OZ6OL, HB9SV, K0YW and OE9ERC. All with excellent signals, even though it was apogee. I worked on 23 cm on 18 Jan DL1YMK, IK3COJ, G4CCH, IK2MMB, GW3XYW, HB9BHU, HB9JAW for initial #187, DF4PV, N2IQ, W2UHI, OZ6OL and HB9Q, and on 20 Jan SM2CEW, JA6AHB and SM5CFS. Heard were HB9SV. With the exception of SM5CFS all signals were booming. Not much activity, in fact the non SWs were about same activity wise as the SW. There was no response to my query (and warning) on Moon-Net about the use of high-speed computers while operating EME. I wonder has anybody else has had such a problem?

More Netnews

F2TU has a new email address F2TU.Philip@guideo.fr.
W9IIX worked K5GW (559) on 1296 in Jan. He is looking for info on the GI7B cavity amp that N2UO is constructing.
VE4MA is still working on gear for 47 GHz EME.
AA5C is working on GS9B PA for 2304.
K9SLQ had a great contact with SM3BYA (549) in Jan.
EI7FJ in IO62RG is working on a 70 cm EME station using 4 x 29 el Cushcraft yagis and 500 W. His UHF call will be EI9E.
WD5AGO is measuring 3 dB of sun noise with a 20" horn on 23 cm. CS/G noise is 6.8 dB.
W5LUA has shipped the HV assembly to VE7CLD for his 24 GHz TWT. It looks like G3WDG will be visiting and able to pick up his 24 GHz gear.
LX1DB has a new email address lx1db@lx1db.com and web page www.lx1db.com. Willie is putting a 3 m Andrews dish on 24 GHz, but will not be QRV until his TWTA arrives. He presently is limited to 5 W.

Expeditions

For those who are on 432, please note that we are preparing an operation on that band from Spitzbergen (**JW/SM2BYA**) sometime later this year, using the EISCAT Svalbard Radar 32 m dish. Exact dates are not available yet - stay tuned...73 to all Gudmund SM2BYA

I presume there is some interest in getting HI8 on 70cm EME. (I'm interested in working it myself). So I'm sponsoring 2x 38el M² for **HI8ROX**.
Perhaps some others can step in and get some parts to complete a eme array. A lowcost transvertor, a small amp, a preamp are items still needed. Of course an expedition going to Santo Domingo could take some parts along, but I'm trying to have as much as possible for the local radioclub down in Santo Domingo. I have some spare tubes, 4CX250B's which could be used building a small amplifier, but I believe its best to have things preassembled as much as possible. Those interested in supporting the project can mail me. ON4ANT

SETI

SETI is pleased to announce the selection of two distinguished authors as its Keynote Speaker and Awards Banquet Speaker for the upcoming SETICon03 Technical Symposium to be held in April.
Opening the Symposium on Friday, 25 April 2003 will be British physicist and engineer Dr. Alex Ellery, with his talk titled "A Critique of SETI Science."
Dr. David Darling will present "Astrobiology and SETI: A Promising New Partnership" at The SETI League's Third Annual Awards Banquet on Saturday night, 26 April 2003.
In addition to these two distinguished speakers, SETICon03

will feature three full days of workshops, technical sessions, panel discussions, meetings, hospitality, and a general sharing of ideas between SETI enthusiasts from among The SETI League's membership base of 1350 individuals from over 60 countries. For the third year in a row, SETICon is being hosted by The College of New Jersey, Trenton NJ, and co-sponsored by the IEEE Student Chapter and the American Radio Relay League. Details and registration forms may be found on the Web at www.setileague.org/seticon.

Silent Key

I am deeply saddened to report that my close friend, **Willy W1ZX**, became a silent key today, January 5, 2003 one day prior to his 66th birthday. Willy was my mentor on EME and a dear friend to many. He will be sadly missed by the entire amateur and EME comunity in particular. Our thoughts and prayers are with Willy, his wife Constance, and his son Bryant. Joe K1RQG

ARI X. Italian EME Contest Memorial Luigi Zorino, I2COR

Date and Time: from 00.00 utc of 10 May
to 24.00 utc of 11 May 2003.
QRGs: 50, 144, 432, 1296, 2304, 5760 MHz, 10 GHz and up. Logs to: i1anp@lunigiana.it

Treasury INTERNET

Modifications for many ham-radios you will find at mods.dk

Plish PA **TH327 for 23cm**. I got many cavities into the EME community lately and you might be interested in the modifications to be made. You find here the detailed project by Eddy, ON7UN and Marc, ON5OT on my website. http://www.hb9bbd.ch/article.php3?key=24
Walter, ON4BCB as well has many interesting pictures and material to similar topics:
http://users.skynet.be/on4bcb/EME/23cm%20EME/Power%20shopping/index.htm
http://www.hb9bbd.ch. 73 HB9BBD

http://www.qsl.net/on5di/ check under **DCF77 link**. Basically is about installing the free downloadable software and feeding the DCF77 signal into the joystick port which I believe in most cases is left unused on our shack computers. It just sounded beautiful to me. So I've gone to see the whole thing working at the same friend of mine house. You bet I will tomorrow start to see if I can cannibalize one of the DCF77 clocks I have to extract the driving signal. Ciao to all Sergio MMB

F5VHX/G8MBI tracking system

http://www.rfham.com/newulti/index.htm
I finally got around to tidying up the pages for my Ulti-track project, the mess is gone, the navigation is faster and easier, and all documents are now in a 'library'.
I put some screen shots of the new G4XBF full PC front end software up there (UThost) it is 4 sys-tems capable, any sensor combinations allowed mixed on any axis, live real-time file swap or DDE software interface capable, setup and calibration 'wizards' etc ....close to done
The new GM4JJJ palm tracker software is available for download (run time limited shareware) along with the other F5VHX free stuff here: www.rfham.com/newulti/index.htm
The new dual axis (az/el) speed controller is currently on the bench being tested. When completed the new G4XBF UT host software will support this with acceleration/deceleration and pan speed. If anyone needs a low cost pro' solution, the entire system is now available configured and in 19" 3U rack.
73 Graham F5VHX/G8MBI

F5VHX: Graham (Graham.D@wanadoo.fr) has developed a direct conversion (zero IF) radiometer -- It converts a band centered on 1296 to the detector chip (down to dc/baseband with no LO or mixer or other stuff to introduce gain drift and noise used). I still have much to do and a lot of software to write for the micro controller that runs it all. The figure is for trees with the leaves are off. The trees were damp. I can measure the difference between damp (more reflective and thus quieter from true Tground), really wet, leaves, no leaves, etc. It clearly shows the effect local environment on receive capability at low elevation. There is a wall of trees to the west only about 15 m from the dish. The other features in the plot range from 50 m to 300 m away. The plots are at 'limited' resolution at the moment only 0.05 dB steps. I expect to be able to reach 0.00625 dB steps (theoretical) eventually. Some of this resolution may get lost in drift and A/D conversion noise. I will perhaps eventually write this up for the newsletter and make the boards and software available for those interested. I still have many weeks of work a head before this project is completed. -

I have been experimenting with a new website http://www.parlorcity.com/k9slq and invite you to visit and report any suggestions and comments to **K9SLQ** k9slq@parlorcity.com. Please place your call in the Subject line if you reply.

Reminder
European EME Contest
15./16. March:
432 MHz + 2.3 to 5.7 GHz
12./13. April:
2m, 23cm and 10 GHz

email DL7APV@t-online.de
73 Bernd DL7APV

FAI News

Reports, Info, Theory

Editor: Dom Dehays, F6DRO
f6dro@aol.com

Study of some interesting QSOs via 2m FAI

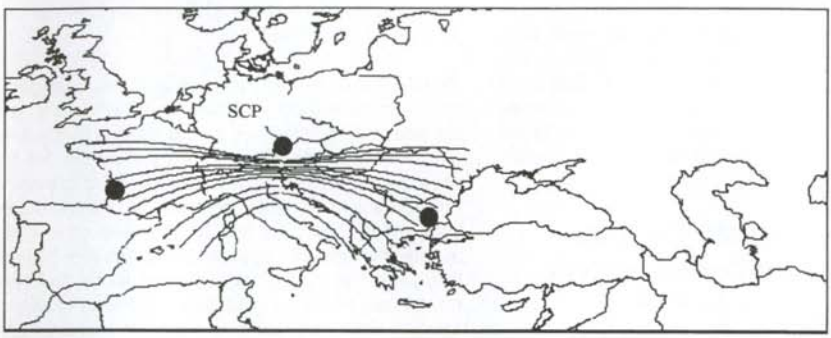


Fig 1. FAI QSO between F6FHP and LZ1KWT on 1st June 2002 at 1652z

This QSO just to show that even if some SCP are very efficient and often available (JN36 for example), any Es may give an FAI opening.
The Scatterer appears to be located in JN68. When trying to compute all locations of the possible scatterers positions between F6FHP and LZ1KWT, there is only a very tiny zone available. This qso was a very lucky one, because the azimuth for F6FHP is the same as to the very common JN36 scatterer. At first Joel thought he was using the JN36 SCP.

If we look at the Es conditions at the same time (DUBUS 2/2002, p 67 and www.dk5ya.de/es_summary_02june_2.htm), we find that there was an opening with a reflection spot at the right place to give FAI. Both guys were probably looking for Es, but they made a FAI qso by getting their antennas in the right azimuth.

The Scatterer is around KN18, UT5JCW also worked IC8FAX that day via the same SCP. Aagain a non traditionnal SCP. Let's have a look at Es the same day: we find (DUBUS 2/2003, p. 80 and DK5YA web page) QSOs between JO61-70 to KN76-84-95.
Once again we can see 2m Es was there at the same time with a reflection spot at the right place.
By analysing several other cases, we can see that it is not necessary for the Es MOF (maximum observable frequency) to reach 144 Mhz but a lower frequency is OK as well. (50-70Mhz)

Fig. 3 is showing that FAI is not only a southern phénomenon.
This QSO took place between 9A1CAL and G4SWX on 10th July 2000. Another station worked by 9A1CAL was PA0PVW in JO22. SCP was located around JO62, and the same qso took place again on 13th July 2000, 27th July but also on 23rd May 2001 and 2nd July 2001, so it seems that northern guys should look for FAI, too!

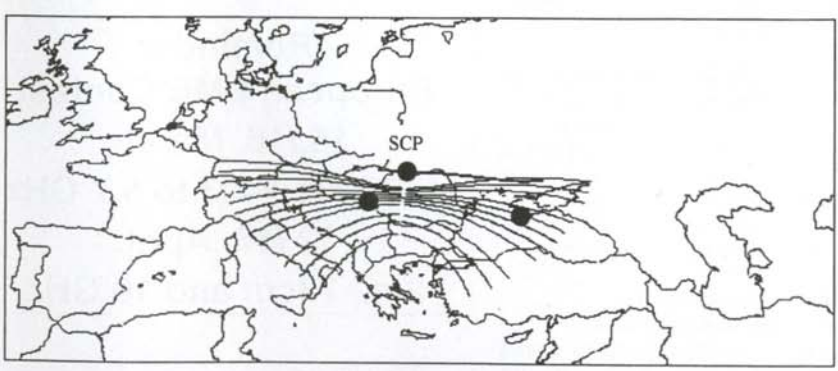


Fig. 2 FAI QSO between UT5JCW and YU7EW around 1910z on 27th June 2002

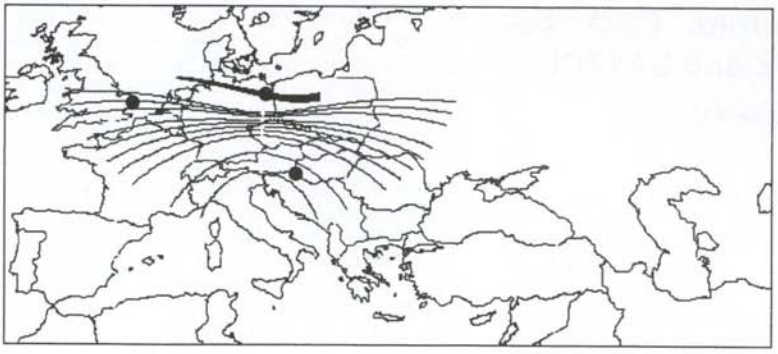


Fig. 3 is showing that FAI is not only a southern phénomenon.

Strategy for 2003

Everybody now should be convinced that FAI is not for southern guys only, but can take place everywhere. I suggest you to look for it.
First by watching the 6m DX-cluster to figure out where an Es reflection spot is active, it is even easier if you get spots from an already open 2m band.

By using a software (see part 1), find which grids you should be able to work using the scatterer found previously. Spot your activity on the cluster/wwc. Ttell that you are looking for FAI via XX scattering point. Report your activity and don't forget to tell which azimuth you were using.

A better understanding of FAI ?

For this we need you to report the qso you made via FAI by sending me the information.

References

-FAI news by DL8HCZ DUBUS 3-2002
-DX radius in aurora and fai propagation by DF5AI

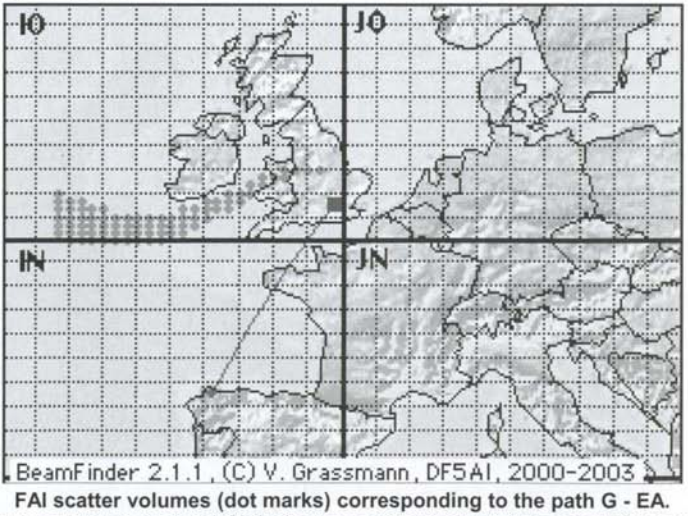
Tnx to: DK5YA, EA6VQ, IC8FAX, UT5JCW, CT1FOH, CT1DNF ect...

FAI on the Edge

Southern England to Spain and Portugal

Volker Grassmann, DF5AI

In this column, FAI opportunities are shown which might encourage radio amateurs to conduct unusual dx propagation tests.



FAI scatter volumes (dot marks) corresponding to the path G - EA.

Please contact the author at feedback@df5ai.net or, alternatively, visit the www.df5ai.net webpage if a detailed analysis of antenna headings, target areas and scatter volumes is required in serious propagation tests.

Unusual Aurora QSO between DK3UZ and UA1ZCL

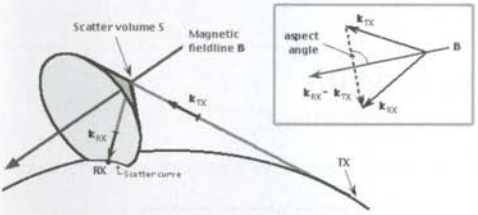
Volker Grassmann, DF5AI

Introduction

Eddi, DK3UZ (JO43), reports an unusual Aurora QSO from many years ago. On Feb. 22nd 1988 at 1452z, he worked Alex, UA1ZCL (KP78), in the 144 MHz band at a noteworthy distance of 2.132 kilometers. Just after this QSO, Alex also managed another QSO to Jürgen, Y22ME JO72). Eddi argues that this QSOs cannot be interpreted in terms of the boundary-fence theory. He discussed his observation with OM Lange-Hesse, scientist at the former Max-Planck-Institute for Ionospheric Research, who speculated about Auroral backscatter originating in the ionospheric F-region (300 km).

F-region backscatter

The above observation was analysed by using the BeamFinder analysis software, version 2.1.2. In this special version, the aspect angle and the scatter height is adjustable between 60 to 90 degree and 90 to 400 km, respectively. The aspect angle is generally close to 90 degree and the scatter height is generally around 105 km in Auroral backscatter.



Remarks: The aspect angle is defined the angle between the difference vector kRX - kTX and the magnetic field line B which penetrates the scatter volume S. kTX denotes the wavevector from the transmitter TX to the scatter volume S and kRX denotes the wavevector from the scatter volume S to the receiver RX.

The above hypothesis of F-region backscatter was tested by varying the scatter height between 120 and 400 km with a constant aspect angle of 88.5 degree. Using BeamFinder's Scatter curve function, no potential scatter volume was however found in this analysis. Thus, there is no evidence for an unusal scatter height in this Aurora QSO.

Aspect angle sensitivity

Since off-normal Auroral scatter was published in amateur radio, the author received emails from many radio amateurs reporting unusual Aurora QSOs. Apparently, this type of Aurora dx communication may be observed more often as expected (and the advantage of high-powered amateur radio stations is possibly smaller than expected). In all cases, the scatter volume was easily identified by adjusting the aspect angle between, say, 85 and 75 degree.

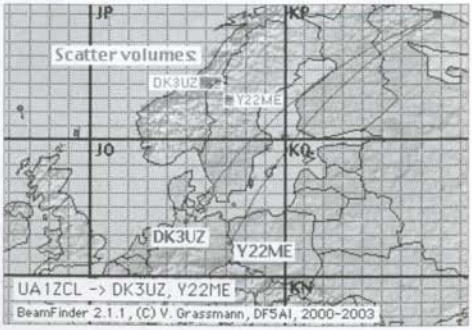
In this particular Aurora QSO, no scatterer was found even with the lowest aspect angle supported by the software at that time, i.e. 70 degree. However, increasing the scatter height from 105 to 110 km finally revealed two scatterers above central Scandinavia, see the map. The scatter height of 110 km corresponds to the upper limit of Auroral backscatter. On the other hand, it is surprising that the difference between 110 km and 105 km is crucial in this particular Aurora QSO. The aspect angle of 70 degree is also noteworthy because it corresponds to the largest ever observed deviation from perpendicularity in amateur radio.

The special BeamFinder version 2.1.2 supports aspect angle settings between 60 and 90 degree. Therefore, the QSO was analysed again to examine the aspect angle without changing the scatter height. In fact, an aspect angle of 69 degree and a scatter height of 105 km may indeed explain the dx communication between DK3UZ and UA1ZCL. The size of the backscatter region is similiar to the size of the Y22ME scatterer in the above map, i.e. this Aurora QSO indeed corresponds to a very small target area in the E-rtegion of the ionosphere.

Calculating the aspect angle in Auroral backscatter requires accurate information on the direction of the magnetic field penetrating the scatter volume. This raises the question on the software's accuracy when analysing Auroral backscatter in periods of geomagnetic disturbances. One might argue that the true aspect angle in this QSO was much closer to perpendicularity because the software's magnetic field model cannot calculate the deflection of the Earth's magnetic field in geomagnetic storms. However, the strength of the main field is around 40.000 nT which is very large in comparison to the field pertubations even in major geomagnetic disturbances. For example: assuming a field pertubation of, say, 1.000 nT the direction of the Earth's magnetic field would vary by less than 1.5 degree. This is in the order of the model's accuracy, i.e. the impact of geomagnetic disturbances may be neglected in this type of amateur radio propagation studies.

Summary

The Aurora QSO between DK3UZ and UA1ZCL may be interpreted by Auroral backscatter at an aspect angle around 70 degree. This aspect angle is the largest ever observed deviation from perpendicularity in amateur radio. There is no reason to assume that the backscatter originated above 110 km, i.e. there is no evidence for F-region backscatter. Considering the small size of the scatter regions, the three radio operators discovered a rariety in Aurora dx communication - this Aurora QSO is indeed remarkable in various aspects.



Tropo Reports

2m, 70cm and up

Editor: Wolfgang Schneider, DJ8ES
DJ8ES@t-online.de

Hallo DUBUS-Leser(innen),
ich bin Wolfgang, DJ8ES. Gerade eben habe ich die Redaktion für den Bereich Tropo-Reports im DUBUS-Team übernommen.
Viele von euch werden mich vom Band oder von diversen Amateurfunktagungen her kennen. Für alle anderen hier eine kurze Vorstellung zu meiner Person:
Geboren bin ich 1957 nahe der PA0-Grenze (JO31), Lizenz seit 1977. Von der ersten Stunde an habe ich mich für UKW-Amateurfunk, hier speziell Tropo-Funkverbindungen, interessiert. Mein Schwerpunkt lag seit jeher auf 70cm oder höher.
Nach meinem Umzug nach Norddeutschland vor nunmehr knapp 15 Jahren hat es dann auch nur wenige Monate gedauert, bis ich wieder auf den Frequenzbändern 2m, 70cm und höher (bis einschließlich 10 GHz) in der Luft war. Die Jagd nach DX-Stationen und Großfeldern konnte neu beginnen. Neben den VHF-, UHF- und SHF-Aktivitäten bin ich auch auf 6m und Kurzwelle qrv. Letzteres reduziert sich jedoch im wesentlichen auf digitale Betriebsarten wie z.B. PSK31.
Als für mich neue Betriebsarten habe ich im letzten Jahr aktiv Meteor-Scatter und Aurora praktisch kennengelernt. Erste Aktivitäten brachten neben einer Reihe neuer Großfelder und Länder auf 144 MHz auch ganz neue Erlebnisse mit diesen höchst interessanten Ausbreitungsmodi.
An dieser Stelle möchte ich euch bitten, künftig mir, und damit der DUBUS und allen DX-Interessierten, Berichte und Infos über Tropo-Aktivitäten auf 2m, 70cm bzw. 23cm und höher per E-Mail direkt zukommen zu lassen. Meine E-Mail-Adresse lautet: DJ8ES@t-online.de
Ausdrücklich gewünscht sind hier auch Aktivitätsberichte von Kontestationen und DX-Expeditionen. Erfahrungen zeigen immer wieder, dass gerade innerhalb der diversen Konteste und anderer Aktivitäten eine Vielzahl von DX-Kontakten über Tropo stattfinden.
Eigene Erfahrungen im Kontestbetrieb unter DL0IZ/p (JO43) auf 2m zeigen, dass ca. 15% der Verbindungen im Bereich 500..700km und sogar 5% der QSO´s über Entfernungen >700km liegen. Diese Ergebnisse werden mit einer für Amateure durchaus üblichen Ausrüstung (200W, 2x11el Yagi) erzielt. Auf eine gute und erfolgreiche Zusammenarbeit.

Dear DUBUS-Readers,
My name is Wolfgang, DJ8ES, and I have recently taken over the tropo report editing in the DUBUS team.
Many of you may know me from the amateur bands or from HAM-Radio conventions. For the others here some information about myself:
I was born in 1957 near the PA0-boarder (JO31), licensed since 1977. Ever since my interests were on VHF/UHF, in particular tropo contacts on 70 cm or up.
After moving to northern Germany (JO43) about 15 years ago, I restarted my activities from here on the VHF/UHF bands. My interests are hunting DX-Stations from the 2 m to the 3 cm bands and collecting the corresponding squares. I'm also qrv on 6m and on HF, the latter mainly in digital modes like PSK31.
Last year I started my first attempts in Meteor-Scatter and Aurora. Both operation modes are fascinating me and I have already achieved a lot of new squares and countries on 144 MHz.
DUBUS readers and other Hams interested in DX, please send tropo information about 2m, 70cm and 23cm+ directly via e-mail to me. My email-address is: DJ8ES@t-online.de
Reports from contest stations and DX-expeditions are appreciated, too. From experience, there are many tropo-DX-contacts in contest and other activities, so please sent them to me.
Own experience in contest under DL0IZ/p (JO43) on 2m show 15% tropo-contacts are in the range between 500..700 km and even 5% with qrb >700 km. These results are possible with a normal equipped station: 200 W, 2x11el Yagi.
Looking forward for a good and successful cooperation.

2m

OZ1IEP, JO55XU, wkd

15/12/2002 09:35	ON1AEN	JO10VW	768km
26/12/2002 09:04	ON1LPA	JO20XO	707km
26/12/2002 09:23	PA5KM	JO11WL	720km
26/12/2002 10:09	ON1AEN	JO10VW	768km
07/01/2003 18:02	ON1LPA	JO20XO	707km
07/01/2003 20:44	ON1AEN	JO10VW	768km
07/01/2003 21:51	SK3MF	JP92FW	868km
04/02/2003 18:06	ON1LPA	JO20XO	707km
04/02/2003 18:15	OK1VRY	JN79FP	710km
04/02/2003 21:34	ON1AEN	JO10VW	768km

tnx fr info, Carl

70cm

OZ1IEP, JO55XU, wkd
14/01/2003 1800-2120z: PA5DD JO22IC 631km, PD4HDB JO32HN 504, PA5KM JO11WL 720, DJ5BV JO30KI 699, DG1KJG JO30NT 645, DL1EJA JO31DS 586, SK4AO JP70TO 570, SK0CC JO99BD 519, SL0ZS JO89XJ 531, OH0JFP KP00AB 667, SM0FZH JO99HI 555, SM0DFP JO99BM 548, SM0F JO89XI 528, PD1AIV JO21EV 663, OK1VT JN79IX 678, SM4L JP70WS 592, SM3BEI JP81NG 672.
11/02/2003 1800-2120z:
PA5DD JO22IC 631km, OH0JFP KP00AB 667, SL0ZS JO89XJ 531, 7S0K JO99AK 538, SM0LQB JO89XK 534, SK4AO JP70TO 570, SM3BEI JP81NG 672, SK0CT JO99BM 548, SM4DXO JP70VO 573, DH8IAB JO30NO 666, PD2DB JO22MD 611, PA5KM JO11WL 720, SM4L JP70WS 592km, SM0FMY JO89XI 528, PD4HDB JO32HN 504, tnx fr info, Carl

OZ1FF, JO45BO, wkd >500km
14/01/2003: 18-22z_
SMØFZH JO99HI 752km, PA5KM JO11WL 537, ON1ALJ JO1ØSS 618, SK4BX JO79OF 584, G4BRK IO91DP 782km.
11/02/2003: 18-22z:
SMØFZH JO99HI 752km, SKØCT JO99BM 737, SM4RPP JO79HH 566, SKØCC JO99BD 716, OHØJFP KPØØAB 860, SK4BX JO79OF 584, SMØLQB JO89XK 724, ON1ALJ JO1ØSS 618, ON4BBF JO11VA 585, SLØZS JO89XJ 722, 7SØK JO99AK 728, SK4AO JP7ØTO 708, ES2WX KO29JN 1082km, OH3AA KP21GA 1127km, SM7FW JO88CQ 595, G3XDY JOØ2OB 600, G4BRK IO91DP 782, OH2HKE KP2ØKD 1107km, ES2RJ KO29JN 1082. tnx fr info, Kjeld

DJ8ES, JO43SX, wkd on 11.02.2002

18:38 OH0JFP	55/55	KP00FB	943km
18:45 SK4BX	57/57	JO79OF	678km
19:23 SM0LQB	55/53	JO89XK	794km
19:38 SK0CC	55/33	JO99BD	777km
19:53 SK6EI	55/55	JO68VK	561km
20:12 SM4RPP	51/52	JO79HH	669km
20:21 SK5CG	55/55	JP80UE	847km

23cm + up

OZ1FF, JO45BO, wkd >300km
18/02/2003 on 23cm

18:27 PA3CEG	JO33FB	59 / 54	302km
18:50 PA5DD	JO22IC	519 / 529	449km
18:53 PA3AWJ	JO21GW	519 / 519	471km
18:56 ON4ANT	JO2ØAR	419 / 419	606km
19:48 DG1KJG	JO3ØNT	519 / 519	537km
20:02 SMØFZH	JO99HI	419 / 429	752km
20:48 SM6ESG	JO67CC	519 / 519	302km
21:28 SM7ECM	JO65NQ	59 / 55	314km
21:33 SK7MW	JO65MJ	579 / 579	310km
21:39 LA2Z	JO59EJ	519 / 419	442km

28/01/2003 on 13cm

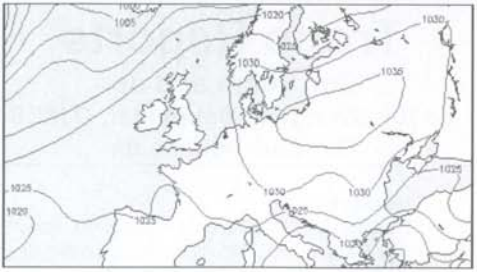
18:54 SK7MW	JO65MJ	519 / 519	310km
19:18 PA5DD	JO22IC	519 / 519	449km
21:30 SM7ECM	JO65NQ	519 / 519	314km

28/01/2003 on 3cm

21:13 SM6EAN	JO57WQ	519 / 519	326km
21:32 SM7ECM	JO65NQ	519 / 519	314km

tnx fr info, Kjeld

Ein von Osten heranziehendes starkes Hochdruckgebiet gestattete am 11. Februar während des NAC (Nordic Activity Contest) eine Vielzahl von DX-Kontakten auf dem 70cm-Band zwischen DL, OZ und SM. An der Nordwestflanke waren QSO´s aus Norddeutschland und Dänemark bis weit nach Schweden hinein möglich. Aber auch südlicher gelegene Stationen kamen zum Zuge. So wurde z.B. DL3YEE (JO42GE) im CW-QSO mit SM4RPP (JO79HH) über 878km beobachtet.



High pressure system, 11. February 03 22z

During the NAC on 11 February, when a strong high pressure zone was moving in from the east, a large number of 70 cm DX contacts between DL, OZ and SM became possible. Northwest of this high pressure system, stations in northern Germany and Denmark were able to reach far into Sweden. Some stations located a bit further south got a chance, too. For example DL3YEE (JO42GE) who reached SM4RPP (JO79HH) in CW with a distance of 878 km. On 16 February the system had moved further to west resulting in openings up to 1400km from G to SM4 (see G4LOH and G8VHI below)

Last Minute reports

G4LOH, IO94ea, wkd on 2m:

16/02/2003 on North Sea Tropo opening SK4MPI/B heard for first time on tropo all evening. QSOs wkd 1742-2216z:
DG7TG JO43SV 57 56 730km, DK7BY JO42KH 57 55 724, SM7OVK JO65RD 55 55 978, OZ8ON JO65GQ 52 55 924, OZ1JTEJO65ER 55 57 914, SM7FWZ JO77EQ 57 59 1075km, SM6VSZ JO67EB 59 59 941, OZ4VW JO45UT 53 59 750, SM6GYD JO66GW 53 56 947, SM6VYP JO67AT 53 54 948, SM7EOI JO86FP 57 59 1176km, SM7MK JO76BJ 59 57 1031, LA4YGA JO48AE 59 59 756, OZ1BNN JO55PM 59 59 844, OZ2PBS JO55XJ 57 59 884, OZ9OW JO46RG 59 59 746, SMØKAK JO89XK 539 549 1331km, SM5CUI JO89VX 529 529 1342km.
Tnx for info, Tim

G8VHI, IO92FM, reports:

16/2/03, evening: **Hrd on 2m** SK4MPI/b JP70 559 qsb, No QSO made as I was on 70cms for most of time. Rig FT847 pa 200w ant 2x14ele Cushcraft

wkd on 70cms: SM6VSZ 59 59 JO67EB #73, SM6ESG 56 57 JO67CC, LA4YGA 58 59 JO48AE, OZ1BEF 57 58 JO46OE #74 his rig 5 W 14 ele @ 2.5m agl!!, SM6CEN 55 52 JO57XO #74 but later 59, hrd beacons: SK4UHF JO79LK 599!!, SK7MHH JO86GP 599 but no stn out there to work!
Rig: IC451 PA 100w 2X23ele CuuDee MGF1302 at ant

23cm hrd: SH4UHI JO79LH 579 QSB, Rig: Old MM xverter dem brick PA MGF1302 in shack, 68 ele WiMo.
All furthest beacons hrd were Tropo ODX from this QTH on each band, just shame no QSO´s were possible. 73s Reg G8VHI@QSL.NET (tnx for info Reg!)

6m News

Reports, Expeditions, Infos
Editor: Joachim Kraft, DL8HCZ

6m-Logbook from DL (Day, Month, UTC):

January to March 2003

2.2. 1400-1900 Aurora from N-DL: SM, GM, LA

9.2. 2030-2200 First good spring TEP from CT + EA to PY5, PY2 and PY1.

10.2. 2200 TEP from EA7+CT: ZD8VHF/B - now almost daily TEP from CT/EA to PY/LU/ZD8

15.2. 1005 weak TEP from S-DL: TR0A/B

No F2 propagation reported from DL since December 29th 2002!

Expeditions and News:

/MM: PA3HEN/MM went QRT in March but plans to be active again during the summer.

/MM: G0KZG/MM, Andy plans to be qrv again on 6m from October during a trip from CT to PY.

KM73 OD5/OK1MU is qrv on 6m until July and will go back to OK after staying a few years in OD.

KP38/48/39/49 The OH8K group plans to activate these squares on 6m (and 2m) during summer 2003.

4U1 UN Geneva: S58J is on duty in Geneva until July 2003. He will activate 4U1ITU again on 6m several times on a short term notice mostly for few hour operations.

5T Mauretania: 5T5SN is qrv on 6m with 10 W and 4 Ele. And made his first QSOs in December.

From June 29th to July 7th DL8YHR etc. will be qrv with QRO on 6m as 5T6M. 50.110 / QSY 50.130.

8P Barbados: Richard, G3RWL will be qrv as 8P6DR from April 5-20. 6 meters may be possible if antennas can be arranged.

9L Sierra Leone: 9L1BTB is new and qrv on 6m.

9Q Dem. Rep. Kongo: 9Q1A has moved to Kinshasa and is qrv again on 6m now. New Loc. Is JI64. QSL via F2YT.

C3 Andorra: ON4ANT plans to be qrv on 6m with QRO (also via EME) from 15th to 22nd of June.

DU Philippines: PA0HIP may be qrv in March 2003 for 3 weeks on 6m from PJ09 / 19.

FJ St. Martin: FJ5DX, is qrv on 6m and aktive with good equipment now.. Loc. FK87ou.

HH Haiti: HH4/K4QD, N2WB, W4WX + K3VN are qrv from 10.-21.March also on 6m.

JW .Svalbard: JW5RIA is qrv again now on 6m until May from KQ26. – JW9LAA will be active on 6m from Bear Isl. (JQ94) until May.

KH2 Guam: KG6DX is back to Guam and qrv again on 6m.

KH0 Saipan: JH5GSG is qrv on 6m from June 5th to 11th. QSL via Homecall.

P4, Aruba: VE3MR is qrv again on 6m as P49MR until April.

S9 Sao Tome: S9TX (ex S92TX) ist qrv on 6m now for about 1 year with 100w + 5 ele Yagi. Loc. JJ30. QSL via W7KNT

ST Sudan: DL5NAM, DL3DXX etc will be qrv from March 16ht to April 2nd as ST0RY also on 6m.

T8 Palau: JA1CJB + JA4RF will be qrv from March 17th to 24th on 6m.

TJ: Ex TT8DX will be qrv on 6m from Kameroon from January 2003 for about 3 months. Later also trips to **5H, XT and TU or TR** will follow. Rig: 100w + dipole. (Erik was in TR in February)

TN Congo: CT3HK will be qrv on 6m as TN3S for 1 year. QSL via Madeira Team, P.O. Box 19, P-9001-901 Funchal, Madeira Isl., Portugal

V3 Belize: K8JP is qrv now on 6m until April as V31JP. QSL via KA9WON.

VK9X Christmas: VK3SIX plans to be qrv on 6m from April 7th to 21st. Call VK9XI.

VP6D Ducie Isl.: The second ever expedition to Ducie was supposed to be qrv until around March 15th also on 6m under VP6DI2.

VP8 Falkland: VP8CSA plans to be active during 2003 2 or 3 times on 6m. May be he will be active also again from St. Helena with his call ZD7CSA.

VP9 Bermuda: From June 13th - 16th N0JK/VP9 is qrv on 6m with 100w + 5 ele. QRG: 50.102. -

W3CMP/VP9 is qrv on 6m from June 27th to July 5th on 6m with QRO and 9 ele.

VQ9 Chagos: VK9LA is qrv on 6m for one year.

XE Mexico: From March 20th – 27th a group is qrv also on 6m as XF2IH from Enmedio island (EK28). QSL via XE1IH.

YA Afghanistan: G4KUX is qrv until spring 2004 on 6m as YA4F from Kabul, MM44ON. – Also Dave, N7BHC, is still in YA and has applied for a licence. Originally he had announced to become qrv on 6m and on 2m via EME.

XV Vietnam: XV9DT will be qrv for some years from Hanoi also on 6m. OL20.

YI Iraq: YI9OM: The new Op OM2DX is QRT and has left the country in January.

Beacons

The new JW5SIX and JW9SIX beacons were expected to become qrv now in February/March 2003. There were some delays with the shipment to JW.

Aurora Reports

Editor: Stefan Heck, LA0BY
LA0BY@darc.de

Dear readers!
Due to some travelling plans I had to finish this issue on a shorter deadline as initially indicated.
In DUBUS 4/2002 we saw two nice examples for advanced Aurora operating techniques:
DF5AI described unusual Aurora propagation between SM2CEW and DL1EJA. The contacts did not comply with the usual scattering model. Reports of repeated contacts gave rise to look for and find alternative paths.
Hidden away in the EME column, SM5BSZ described a technique for discriminating between local and DX stations on Aurora: Leif suggests to transmit in vertical polarisation to minimise Aurora signals from local or N/S stations. DX signals from E/W paths will improve because they arrive more or less in vertical polarisation.
Try to experiment with these concepts yourself if you have elevation and polarisation control on your antenna system. And tell us about your results... 73, Stefan (LA0BY)

EI2TAA in IO42WA wkd on 144 MHz in CW:

2002-11-20

19:42	GM4VVX	IO78TA	59A	59A
19:47	G4ASR	IO81	55A	52A
19:50	SK6DK	JO67EH	52A	52A
19:52	G0FYD	IO83LS	52A	55A
19:54	G4KWQ	IO92AQ	53A	53A
19:55	GI6ATZ	IO74AJ	57A	52A
20:08	G4HGI	IO83PL	55A	56A
20:33	G3UTS	IO94CU	52A	52A
20:39	G4LOH	IO94IA	55A	55A

LA0BY in JO59FW wkd on 144 MHz:

2003-01-03

1822	GM4VVX	IO78TA	56A	59A	0	874 km
1848	G4LOH	IO94EA	59A	55A	340	982 km

Rig: 200 W, 9-ele-yagi

PA3BIY in JO22EB wkd on 144 MHz:

2002-04-15

1701	OH5LK	KP30ON	55A	55A	1682 km
1710	EW6FS	KO35LB	53A	55A	1521 km
1718	LY2IC	KO14WW	53A	55A	1324 km

2002-04-19

1537	YL3AG	KO26AW	56A	59A	1374 km
1614	LY2IC	KO14WW	53A	55A	1324 km
1620	PD0RFU	JO32LS	56A	55A	192 km
1625	SM5BUZ	JO78MR	55A	55A	999 km

2002-05-11

1727	SM6OPX	JO58RG	53A	53A	823 km

2002-05-22

1644	DK9TF	JO31NF	55A	55A	211 km
1647	DJ2IE	JN48HV	54A	55A	463 km
1648	IK1EGC	JN35UF	56A	55A	798 km
1650	I1DMP	JN35UB	57A	56A	816 km
1651	S54G	JN65TM	56A	59A	992 km
1652	9A2RD	JN65TF	55A	57A	1017 km
1653	DH7FB	JO62SM	59A	57A	625 km
1654	F6BEG	JN25WS	55A	56A	708 km
1656	HB9DFG	JN37SM	59A	59A	554 km
1659	9A4EW	JN95JG	54A	57A	1296 km
1700	OK1AMI	JO70VA	53A	53A	829 km
1704	S53VV	JN65UM	53A	54A	996 km
1706	I1JTQ	JN35UB	56A	55A	816 km
1712	DL1ANA	JO50TW	52A	55A	517 km
1716	DL1NUX	JO50LG	52A	51A	500 km
1734	LY2IC	KO14WW	53A	55A	1324 km

2002-10-01

1549	ES6RQ	KO28WA	53A	55A	1512 km
1610	G3PJW	IO83PM	55A	57A	503 km
1612	OH5LK	KP30ON	54A	55A	1682 km
1617	PD1ANQ	JO31EW	55A	57A	138 km

All QSO in CW. Tnx fer report, Peter!

Days with 2m Radio-Aurora in January / February 2003:

Jan 1st 2230 from SM3 to SM4 / LA
Jan 3rd 16-19 from SM4 to N-DL, UA1, G 21-22 to SM7, OZ
Jan 4th 1630 from SM4 to OH5
Jan 7th 1700 from SM4 to OH6
Jan 9th 1900 from SM4 to OH6
Jan 10th 1520-1900 from SM4 to OH5, 1900 to N-DL
Jan 15th 1620 from SM4 to OH5
Jan 19th 1500 from SM4 to OH6 1745 to N-DL
Jan 20th 1550 from SM4 to OH5
Jan 22nd 1300 from SM4 to OH6
Jan 23rd 1430 from SM4 to OH4
Jan 24th 0445 from SM4 to N-DL 1330-1600 to OH5,6
Jan 25th 1400 from SM4 to OH6
Jan 26th 1800 from SM4 to SM2
Jan 29th 1430-19 from OH3 to SM2, SM4, LA
Jan 30th 0030-0245 from N-DL to SK4MPI
Jan 30th 1630-1800 From N-DL to SM, GM, OH
Jan 31st 1410-1645 from SM4 to OH, UA1, SM2
Feb 1st 2230 from N-DL: SK4MPI
Feb 2nd 13-19 From DL/PA to SM, LA, OH, ES, GM
Feb. 4th 18-19z From SM4 to OH, N-DL, PA, from G/EI to GM
Feb 6th 14-19z from SM4 to OH5, N-DL, OZ, SM2
Feb 9th 15z from SM4 to OH5, 17-19 from N-DL: OH, SM, GM
Feb 10th 1710 from SM4 to OH5
Feb 11th 1610 from SM4 to OH1 (KP03)
Feb 12th 1600 from SM4 to OH1 (KP03)
Feb 14th 1530-1730 from SM4 to OH1, RX1AS
Feb 16th 1330-1730 from SM4 to OH1+6, SM0, N-DL, RX1AS
Feb 18th 1550 from SM4 to OH1
Feb 19th 1920 from SM4 to OH1, SM0, UA1
Feb 21st 1550 from SM4 to OH6 (KP02)
Feb 22nd 1430- from SM4 to OH1, SM2
(Note: SM4 means the SK4MPI beacon in JP70 was heard!)

Meteor-Scatter

Reports

Norbert Göttsche, DL8LAQ@gmx.de

Please keep sending reports and don`t forget the locator, busts and pings etc.

DK5KK, Matti has sent a list of QSOs made in 2001 from JP91. This is probably the first and only MS activity ever from JP91.

DK5KK/mm (JP91) wkd on 144 MHz:

2001-06-05

1945	DK3BU	JO33NO	27	27	c
1955	DK3WG	JO72GI	27	26	c
2030	DK1KO	JO53CT	27	27	c
2052	DJ7OF	JO51HQ	27	27	c
2130	DJ9YE	JO43HV	27	27	c
2220	DF7KF	JO30GU	27	38	c
2237	DL1EJA	JO31DS	26	38	c

All QSOs random! Not complete: DF8LC, DK9OY and DL5ME.

DL3IAS (JN49EJ) wkd QRP on 144 MHz:

2002-11-04	2103	EA6/DJ4UF	JM08BR	26	27 fsk
2002-11-18	2250	EA6/DL6SAQ	JN20CA	27	27 fsk
	0205	OH1XT	KP01UK	39	39 ssb
2002-12-11	2235	YU7MS	KN05EF	26	27 fsk
2002-12-12	2230	EA3DXU	JN11CM	27	27 fsk
	2310	SP2OFW	JO93AC	26	27 fsk
2002-12-13	2010	LZ9W	KN12MO	27	27 fsk
	2055	LY2BIL	KO24PQ	27	27 fsk
	2350	F6CRP	IN96KE	27	27 fsk
2003-01-03	2050	GW3LEW	IO71PS	27	26 fsk

Only complete QSO´s are listed! Rig: IC735 + LT2S, 20W out, MGF1302, 16ele F9FT. 73, Nino.

DL8BDU (JO43AA) wkd on 144 MHz:

2002-11-15	2148	OH8K	KP55AS	26	26	c fsk 1872km
2002-12-12	1842	RA3AQ	KO85SP	26	26	c fsk 1926km
2002-12-130	1756	RK3AF	KO85QR	27	26	c fsk 1915km
2003-01-031	1548	RA3DQ	KO85QU	27	27	c fsk 1908km

Rig: TR-751E, 15ele Yagi, PA 450W, Preamp 0,6dB. Tnx, Klaus.

DL8EBW (JO31NF) wkd on 144 MHz:

2002-09-21	0650	0800 TA/DH7FB	KN30	26	– 3/5/1 nc rndm	
2002-10-02	0345	0510 G0KZG/MM	IN39	27	26 6/14/1.5 nc	
2002-10-06	0505	0546 G0KZG/MM	IN18	26	26 9/21/1 c	
2002-10-14	0400	0426 OH8UV/DH3YAK	KP34	26	26 4/11/1.5 c 1890k	
2002-10-15	0350	0436 G0KZG/MM	IN39	26	27 8/11/1 c # *1	
2002-10-19	1251	1350 G0KZG/MM	IN49	26	26 6/8/0.6 c # *1	
2002-10-21	0350	0416 G0KZG/MM	IO50	26	26 8/6/1 c # *1	
2002-10-17	0500	0530 UR3EE	KN88		nil 2112km	
	1200	1421 OH8K	KP55 27 27 7/3/0.2cf# 2070k			
2002-10-18	0300	0432 OH8K	KP55 26 27 3/8/2 c 2070km			
2002-10-19	0135	0136 YM3XC KN30FC 29 26 1/-/15 c s r # 1934k				
	0300	0330 RA1QA	KO99WF		nil 2229km	
	0700	0730 SV5BYR	KM46		nil f 2356km	

Remarks: # New square. *1 Andy used only 50W due to failed power amplifier! (f = FSK / WSJT)

Leonids 2002: Some words about these event. Far Out of from all predictions I took 2 days off and got qrv from my hill in front of the city. I was qrv from 17-11 13 UTC to 19-11 13 UTC. In first 2 days condx was really terrible and I was qrv first time longer on FSK441 - a nice tool for running qsos outside any shower (every ping completes qsos, hi) but still not fixed procedures and cluster qsos makes these mode not an optimum one. Completed with the OH8K gang first in 2 1/2hours in FSK441 (17.11) and than with 3burst in 1 1/2h in HSCW (2070km). After a bit of sleep, I got on at 01 UTC on 19.11. and was lucky to find Andy YM3XC KN30FC in SSB on .200 direct as a new one - after 1hour, condx in SSB dropped again... - a maximum was seen here at 03-05 UTC - completed UR3EE over 2112km while one hour later the reflections went down. A second peak (as prediced) was not seen in my QTH! So many thanks for all nice qso and was a pleasure and a lot of fun again to be qrv over such long time! 73, Guido – http://www.qsl.net/dl8ebw/

EA7/DJ4UF/P, IM96bw, Report:

Leider waren die Reflexionen sehr mäßig. Der Standort südlich von Carboneras beim Leuchtturm war funktechnisch sehr ruhig mit freier Sicht von 20-35 Grad und von 45-70 Grad. Die Antenne war wegen des starken Windes mit Seilen festgelegt und konnte nur mit Mühe verdreht werden. Ich habe sie später auf 30 Grad stehen gelassen, denn aus 50 Grad kam auch nach längerem CQ-Rufen nichts. Nach England war eine hohe Gebirgskette (mindestens 10 Grad Elevation) im Wege. Wir haben später auf der Rücktour noch nach einem freien Standort für Richtung Norden gesucht. Wir haben keinen gefunden in IM96. Also: Sidescatter! Ich hatte mit GW3LEW über Cluster Sidescatter vereinbart (meine Antenne 25 Grad), aber es hat nicht geklappt. Ich habe nur einmal "LEW" gesehen. Hier eine kurze Zusammenfassung der QSO's. Leider habe ich nicht die Anzahl der Pings aufgeschrieben. Skeds DL2OM, DK5WO und GW3LEW, alles andere Random:

EA7/DJ4UF/P (IM96BW) wkd on 144 MHz:

2003-02-08 (UTC – Call – C/NC - max. burst/ping)

1100	1120	DF2ZC	c	6dB 160ms
1225	1255	ON1IM	c	4dB
1255	1336	PE1HWO	c	6dB 360ms
1341	1349	F6FHP	c	
1350	1414	DF8IK	c	5dB 400ms
1515	1615	OE5MPL	nc	nur 1 Ping
1650	1814	S59F	c	3dB 140ms (fast 1,5h!)
1813	1925	DL0UL	c	9dB 2500ms!
1925	2021	PA0BAT	c	8dB 1580ms!
2005	2038	DL4DWA	c	
2046	2112	DL1GGT	c	10dB 1560ms!
2120	2219	DC9YC	c*	6dB 600ms (*nicht sicher)
2219	2252	DG6JF/P	nc	4dB 320ms (nur 1 Ping)

2003-02-09

0800	0844	DM7FB	nc	3dB 100ms
0844	0945	G4ZTR	nc	nur 1 fb Anruf-Burst ohne RST (blind?)
1000	1055	DL8BDU	c	7dB 300ms
1058	1124	DG6JF/P	nc	3dB 160ms (2.Versuch)
1124	1205	G0GMS	nc	8dB 400ms
1318	1330	DC9YC	nc	6dB nur insgesamt 3 Pings
1400	1500	DK5WO	nc	1dB 100ms (5WO: 100W + 10El.)
1607	1637	DL2OM	c	10dB 2150ms! davon in den ersten 5 Perioden jede Menge, danach normale 6dB
1716	1750	DG6JF/P	nc	2dB 100ms (der kpl. Anruf, aber leider 3.vergeblicher Versuch, sorry!)
1810	1825	I5YDI	c	6dB 360ms
ca.1900	1930?	GW3LEW	nil	(Zeit nicht eingetragen)
ca.1930	2100	CQ	nil	

Im November diesen Jahres werden wir diese Aktivität wiederholen. Bis dahin brauche ich eine PA. Eckart, DJ4UF.

DJ4UF will be qrv again in November from IM96 via FSK on 2m!

EI2TAA - The Ireland Expedition Log

We started operation from the cottage on 17. November 2002 as EI/DK5DQ. The cottage is located in IO42WA. We chose it because it offer free line of sight to the desired direction (VO1) from 100m above the sea level. However, high mountains to almost all others directions made it difficult to work into central Europe.

EI/DK5DQ log from IO42WA (cottage)

2002-11-17

1925	DL6YEH	JO32VA	26	26	c fsk 120' 300ms/13dB
2140	PE1OPK	JO23UE	26	26	c fsk 40' 440ms/8dB
2308	DG6JF/p		27	27	c fsk 7' 500ms/12dB
2315	DF8IK	JO30JT	27	27	c fsk 10' 160ms/13dB
2327	DL6BF	JO32QI	27	27	c fsk 21' 1200ms/13dB

On 19. November 2002 we got the permission to operate with special callsign EI2TAA at increased power levels (400W regular, 750W during the meteor shower). We decided to operate from top of a mountain in IO41TU during the shower, which was clearly a better location than the cottage.

EI2TAA log from IO41TU (mountain)

2002-11-19

0503	TK5EP	JN41IW	59	59	c ssb
0504	EI5FK	IO51RT	59	59	c ssb tropo
0505	GW3LEW		59	59	c ssb tropo
0506	EI8JK		59	59	c ssb tropo
0507	F6KHM		55	55	c ssb tropo
0508	G4RRA	IO91OF	57	57	c ssb tropo
0509	F8DBF		55	55	c ssb tropo
0510	GW4VEQ	IO73SG	58	58	c ssb tropo
0530	I1DMP	JN35UB	59	59	c ssb
0533	IK2YXK	JN45OP	37	39	c ssb
0600	DF1CF	JN57FP	59	59	c ssb
0600	DL3IAE/p	JN49DE	59	59	c ssb
0601	DH7FFE		59	59	c ssb
0601	DL0UL	JN48XK	59	59	c ssb
0601	DL1MAJ	JN68AH	59	59	c ssb
0602	DK8VS	JN39NF	59	59	c ssb
0608	F4ARU	IN94VT	59	59	c ssb
0637	DL6YEH	JO32VA	59	59	c ssb
0832	IW2HAJ	JN45NO	37	37	c ssb

After the shower, we moved back to the cottage in IO42WA. We tried to find a better location for the antenna than before, which meant using the full 100m of Ecoflex15 cable. This gave better take-off into Europe than before, but we still were limited to the direction N - NO.

EI2TAA log from IO42WA (cottage)

2002-11-20

2200	PA0BAT	JO31FX	27	27	c fsk 30'
2230	PA0CIS	JO22FD	26	26	c fsk 25' 300ms/9dB
2340	DG6JF/p	JO33QN	27	27	c fsk 12' 220ms/9dB

2002-11-21

0500	DG5CST	JO60DS	-	-	nil hscw
0700	DL4DWA	JO61QH	-	-	nc fsk 1060ms/9dB
2000	PA2DWH	JO22GD	27	27	nc fsk 440ms/22dB
2050	OZ1IEP	JO55XU	27	26	c fsk 5' 540ms/11dB
2058	EI4IX	IO53HV	55	57	c ssb tropo
2105	DL6YED	JO31LO	-	-	nil fsk qrt 2145utc
2200	DH7FB	JO62	-	-	nil fsk qrt 2250utc
2255	DL1SUZ	JO53UN	26	26	c fsk 25' 240ms/5dB

2002-11-22

0000	DL9MCC	JN58	-	-	nil fsk qrt 0045utc
0617	DH8IAT	JN49GC	26	26	nc fsk no RR
0720	ON4GG	JO20AR	26	27	c fsk 33' 400ms/4dB
0753	DC9YC	JO31PI	36	26	c fsk 25' 19"/S3
0825	DL4DWA	JO61QH	26	-	nc fsk
0855	GW4VEQ	IO73SG	52	52	c ssb tropo
0909	ON4ANT	JO20AR	26	26	nc fsk no RRR
1850	PE1HWO	JO21GV	27	27	c fsk 26' 400ms/12dB
1905	PA2DWH	JO22GD	26	26	nc fsk no RRR
2000	ON4KHG	JO10XO	26	-	nc fsk
2105	PA2DWH	JO22GD	26	27	c fsk 35'
2140	OZ1LPR	JO44WX	27	27	c fsk 9'
2204	PA1BVM		26	27	c fsk 56'
2300	DL4DWA	JO61QH	-	-	nil fsk qrt 2325utc
2325	ON4ANT	JO20AR	27	27	c fsk 10' 2000ms/14dB

73 from the crew: Harry, DL2DAO, Nico, DK5DQ and Volker, DL5DAW.

G0KZG/mm worked:

2002-09-28

1235	1255	DK1KO	27	27	IO55UH	fsk JO53LT
1305	1320	DL5WG	26	26	IO55UH	fsk JO52VK
1320	1340	DJ7OF	26	27	IO55UH	fsk
1341	1351	GW4VEQ	55	-	IO55UH	ssb
1351	1355	GI6ATZ	59	59	IO55UH	ssb IO74AJ
1355		G4LOH	56	52	IO55UH	ssb IO94IA
1357		G4HGI	56	57	IO55UH	ssb IO83PL
1359		G4KWQ	57	55	IO55UH	ssb IO92AQ
1429	1450	DL1GGT	26	26	IO94MW	fsk
1450	1503	G0FIG	-	-	IO54MW	nil fsk
1916	1923	G4HGI	36	57	IO44XL	fsk IO83PL
1925	1932	PE1HWO	-	-	IO44XL	fsk no reply
1931	1951	DL5WG	-	-	IO44XL	fsk no reply
1939		GW4VEQ	59	59	IO44XL	ssb
1939		G4LOH	59	59	IO44XL	ssb
1940		G4RRA	59	59	IO44XL	ssb IO91OF
1951	1956	OZ1IEP	-	-	IO44XL	ssb no reply
1956	2015	DC9YC	26	26	IO44XL	fsk

2002-09-29

0400	0445	PA3BIY	26	26	IO43MD	hscw tests
1301	1330	EI5FK	59	59	IO41FV	ssb IO51RT
1329	1334	G4RRA	56	57	IO41FV	ssb IO80BS
1334	1337	GW3WHR	519	419	IO41FV	cw IO71XN
1339		G4LOH	57	53	IO41FV	ssb IO94IA
1354		DL1RNW	26	26	IO41FV	nc fsk
1412	1413	G4HGI	59	59	IO41FV	ssb IO83PL
1413	1415	MW1MFY	57	59	IO41FV	ssb IO81FL
1415	1416	GW3MFY	57	57	IO41FV	ssb IO81FL
1442		GW8IZR	59	59	IO41EN	ssb IO73TI
1443		EI8IP	59	59	IO41EN	ssb IO63NR
1444		GI6ATZ	56	55	IO41EN	ssb IO74AJ
1455		EI4CI	55	54	IO41EN	ssb IO63RM
1800	1845	PA2DWH	26	26	IO41CJ	cw 11b>20p 1s S3
1918	2005	DF8IK	26	26	IO41CJ	cw 18B>20p1S S3

2002-09-30

0403	0417	DL5MAE	26	26	IO41DF	cw 13B 18p 1S S3
0418	0508	DL5WG	26	27	IO41DF	cw 12B >20p 1S S3
0520		G0CUZ	599	599	IO41DF	cw IO82WM
0525	0602	DL1EAP	26	26	IO41DF	cw 13B >20p 1S S3
0602	0617	DJ9CZ	26	27	IO41DF	cw 11B 11p 1S S3
0625	0639	GW4VEQ	57	59	IO41DF	ssb
1759	1801	EI5FK	59	59	IO41EF	ssb IO51RT
1803	1805	GW4VEQ	53	54	IO41EF	ssb
1806		G4RRA	55	57	IO41EF	ssb IO80BS
1811	1852	DL7FF	26	27	IO41EF	fsk nc no RRRR
1852	1900	G0FIG	-	-	IO41EF	fsk nil
1900	1921	DC9YC	26	26	IO41EF	fsk 560mS s5
1919	1936	OZ1IEP	26	26	IO41EF	fsk 160mS S4
1939	1951	PA5DD	26	26	IO41EF	fsk 100mS S3

1951	1958	DL4ANT	26	27	IO41EF	fsk 200mS S3
2001	2100	DL6ZAU	27	26	IO41EF	fsk Abandonned-Alarms
2002-10-01						
0509	0530	DJ9CZ	27	27	IO41BG	cw 17B>20p1S S5
0537	0557	DJ7OF	27	27	IO41BG	cw 10B 20p 3S S5
1745	1751	EI5FK	-	-	IN39PV	ssb called-no reply
1814	1901	DH3YAK	26	26	IN39PV	cw 19B 19p 1S S3
1901	1915	PA3DZL	-	-	IN39PV	cw called -no reply
1915	1925	EI5FK	55	54	IN39PV	ssb IO51RT
1925	1928	G4RRA	53	57	IN39PV	ssb IO80BS
1932	1937	F6KHM	53	55	IN39PV	ssb IN78RT
1944		GW4VEQ	559	559	IN39PV	cw IO73SG
1948	1957	DK1KO	27	27	IN39PV	fsk 120mS S5
2002	2026	PE1HWO	26	27	IN39PV	fsk 140mS S4
2028	2040	G4FUF	26	27	IN39PV	fsk 160mS S5
2040	2046	ON1IM	-	-	IN39PV	fsk no reply
2046	2102	GW3HWR	37	28	IN39PV	fsk 10s S5
2002-10-02						
0400	0500	DL8EBW	-	-	IN39FU	fsk nc
0500	0600	PA3FOC	-	-	IN39FU	fsk nc
1919	2000	DL1EJA	26	26	IN29LH	cw 4B 6p 1S S4
2002-10-03						
1754	1808	G3IMV	26	26	IN19SA	fsk 180mS S4
1808	1808	OZ1IEP	-	-	IN19SA	fsk no reply
1817	1833	DF8IK	-	-	IN19SA	fsk no reply
1843	1910	G4FUF	27	27	IN18TX	fsk 200mS S5
2002-10-04						
0400	0500	G4HGI	26	-	IN18OT	cw nc
0500	0600	PA3DZL	-	-	IN18OT	cw nil
0600	0630	DL8EBW	-	-	IN18OT	cw nil
2002-10-05						
0400	0500	I2FAK	26	26	IN18PV	cw 20S!S3 0418z
1401	1457	DG6JF/P	26	26	IN18NV	fsk 280mS S3
1457	1515	G4FUF	27	27	IN18NV	fsk 120mS S5
1759	1910	DL5ME	26	26	IN18VX	cw nc
1938	2042	DL8GP	26	-	IN18VX	cw nc
2002-10-06						
0400	0500	G4HGI	26	26	IN18ST	cw nc no calls
0500	0520	PA3DZL	-	-	IN18ST	cw no show
0520	0552	DL8EBW	26	26	IN18ST	cw 11P 9B L1S S3
0552	0614	DH3YAK	26	26	IN18ST	cw 1S S4
0614	0647	PA3FOC	-	-	IN18ST	cw no show
1318	1336	G3IMV	27	26	IN19VA	fsk c 220mS S4
1339	1348	G4FUF	27	27	IN19VA	fsk 560mS S5
1356	1444	DG6JF/P	26	-	IN19VA	fsk nil
1924	2037	DL8GP	26	26	IN18SX	cw 10B 21p 1S S3
2002-10-07						
0400	0515	PA3DZL	-	-	IN18PV	cw no show
0515	0540	PA3FOC	-	-	IN18PV	cw no show
1907	2014	GW4VEQ	27	26	IN19WA	fsk 140mS S5
2002-10-08						
1804	1821	DK1KO	26	27	IN18TW	fsk 120mS S5
1827	1840	G3IMV	-	-	IN18TW	fsk nc-already wkd
1843	1911	DJ7OF	27	26	IN18TW	fsk 420mS S5
1911	1937	DF8IK	27	26	IN18TW	fsk 440mS S5
2002-10-09						
1840	1940	G4HGI	26	27	IN18UP	fsk 160mS S4
1956	2025	DC9YC	27	26	IN18UP	fsk 320mS S5
2025	2032	GW4VEQ	26	26	IN18UP	fsk 280mS S5
2002-10-10						
0357	0420	DL1EJA	26	27	IN18LW	cw 25B>30p1S S5
0422	0523	PA3ECU	27	27	IN18LW	cw 1S S5
1833	1855	G4RRA	26	27	IN18RQ	fsk 380mS S5
1930	1957	GW8ASA	27	26	IN18RQ	fsk 620mS S5
2002-10-11						
0441	0517	DL1EAP	26	26	IN19NB	cw 4B 22p IS S4
1835	1940	G4EZP	26	27	IN18SS	fsk 360mS S5
2002-10-12						
0355	0500	LA6HL	26	-	IN18SV	cw nc
0500	0600	PE1HWO	26	-	IN18SV	cw nc
1802	1823	GW8ASA	26	26	IN19XC	fsk 200mS S5
1837	1857	G4RRA	27	37	IN29AD	fsk 160mS S6
1905	1930	GW8ASA	26	-	IN29AD	fsk lost contact
1930	1945	G4FUF	27	27	IN29AD	fsk 220mS S6
1947	2008	DF8IK	26	27	IN29AD	fsk 3S S6
2009	2021	G4ZHI	26	27	IN29AD	fsk 260mS S5
2023	2036	DJ3LE	27	26	IN29AD	fsk 460mS S5
2043	2055	DL3TW	27	26	IN29AD	fsk 380mS S5
2100	2130	DC9YC	27	-	IN29FM	fsk nc no RRRR
2131	2140	OZ1IEP	27	26	IN29FM	fsk maybe nc
2002-10-15 (50W TX power)						
0350	0456	DL8EBW	26	26	IN39IT	cw 10B 30p 2S S6
0456	0707	PA2DWH	26	26	IN39IT	cw 28B>40p1S S5
1855	1913	DJ9YE	26	26	IN39FV	fsk 160mS S5
1919	1950	OZ1LPR	27	27	IN39FV	fsk 400mS S7
1950	2018	PE1HWO	26	26	IN39FV	fsk 160mS S4
2002-10-16 (50W TX power)						
1800	1904	PA3BIY	26	26	IO40BJ	cw 19B>30p1S S4
1912	2052	PA3BZL	26	26	IO40FM	cw 36B>40p1S S4
2058	2222	PA2DWH	26	26	IO40LS	cw 21B>35p2S S5
2058	2122	PA2DWH	26	26	IO40LS	cw 21B>35p2S S5
2002-10-18 (50W TX power)						
1828	1834	EI5FK	519	519	IN39GR	cw
1842	1911	G0GMS	26	26	IN39GR	fsk 100mS S4
2002-10-19 (50W TX power)						
0335	0500	DL5MAE	26	26	IN39XV	cw c 18B 27p 1S S4
0500	0540	PA3ECU	26	26	IN39XV	cw c 17B 17p 5S S4
0540	0607	DL1EJA	26	26	IN39XV	cw c 17B 29p 1S S5
1254	1357	DL8EBW	26	26	IN49CR	cw 15B 9p 1S S4
1357	1452	PA3FOC	26	27	IN49CR	cw 17B 15p 1S S4
1458	1600	PA3ECU	26	26	IN49CR	cw c 11B 21p 1S S4
1819	1909	DG6JF/P	26	27	IN49CR	fsk c L420mS S5
1921	1951	DJ70F	26	26	IN49CR	fsk 240mS S5 c
2002-10-20 (50W TX power)						
1800	1810	EI5FK	519	519	IN49RD	cw IO50RT
1827	1902	PA0JMV	26	27	IN49RD	fsk c 980mS S5
1902	1933	DF8IK	26	26	IN49RD	fsk c 300mS S5
1944	2002	OZ1LPR	27	27	IN49RD	fsk c 400mS S5
2006	2027	DJ3LE	26	26	IN49RD	fsk c 460mS S5
2002-10-21 (50W TX power)						
0351	0419	DL8EBW	26	26	IO50FO	cw c 18B 30p 1S S5
0419	0452	PA3BIY	26	26	IO50FO	cw c 6B 19p 2S S5
0419	0527	DH3YAK	26	26	IO50FO	cw c 25B 37p 1S S4
0529	0627	PA3BZL	26	26	IO50FO	cw c 32B 44p 1S S4
2002-11-09 (Only 10W TX power!)						
1813	1930	PA3ECU	26	27	IO49IH	cw c 2B 2p 2S S4
2002-11-10						
1803	2017	PA3BZL	26	-	IP00VF	cw nc no call or R
2002-11-11						
0424	0505	PA3BIY	26	-	HP80XJ	cw nil except bits
0505	0537	G0CUZ	26	26	HP80XJ	cw c 6B 10p 1S S4
1802	2100	PA3BIY	26	26	HP80OV	cw nc no RRR
2002-11-12						
0400	0517	PA3BZL	26	26	HP81VP	cw c 18B 31p 1S S4
0520	0548	GW4VEQ	26	26	HP81VP	cw c 12B 22p 1S S4
0550	0642	G0CUZ	26	26	HP81VP	cw c 12B 15p 1S S4
2002-11-16						
0425	0542	G0CUZ	26	26	HP52QM	cw c 18B 21p 5S S3
1806	1839	GW4VEQ	26	26	HP52LD	fsk c fsk 440mS S5
1850	1950	G4LOH	27	27	HP52LD	fsk nc fsk no RRR

2002-11-17

1802	1820	GW4VEQ	26	26	HP61DS	c fsk 500mS S5
1849	2015	G4HGI	37	-	HP61DS	nc fsk no rst

2002-11-18

0330	0500	PA3BIY	-	-	HP61FP	cw nil
0507	0602	G0CUZ2	6	26	HP61FP	cw c 12B 19p 2S S4

2002-11-19

0035	0145	GW3HWR	26	-	HP52KM	fsk nc fsk
0221	0301	G0CUZ	36	26	HP52DM	cw c 10S S4
0536	0622	G0CUZ	26	46	HP42UI	cw c 5B 6p 25s S3!!
0820	0926	GW4VEQ	47	26	HP43TG	cw c 90s S5! 7B 5P

2002-11-24

1937	2057	G4YTL	26	26	HP84SB	cw 13B 12P 1s S4 c

2002-11-25

0421	0457	G4YTL	26	26	HP73PQ	cw 13B 11p 1s S5 c
0513	0627	G0CUZ	26	26	HP73PQ	cw c 17B 19p 1s S4
0632	0705	G4ZHI	26	26	HP73PQ	cw c 15B 18p 1s S5

2002-11-27

1844	1910	G4ZHI	26	26	HP84QB	cw c 4B 7p 1s S5
2013	2130	PA3BIY	26	-	HP83HS	cw nc

2002-11-28

0359	0430	G4YTL	26	26	HP72JS	cw c 9B 10p 2s S5
0430	0507	G0CUZ	26	26	HP72JS	cw c 13B 16p 1S S4
0529	0602	GW4VEQ	26	27	HP72JS	cw c 13B 15p 1s S4

2002-11-29

0414	0449	G0CUZ	26	26	HP50FD	cw c 11B 7p 1s S4
0449	0527	GW4VEQ	26	26	HP50FD	cw c 11B 10p 6s S5

2002-11-30

0437	0602	G0CUZ	46	26	HP30XN	cw c 8B 5p 25s S4

2002-12-03

0434	0605	G0CUZ	26	26	HP51LB	cw c 19B 19p 1s S4

2002-12-04

1803	1900	G0FIG	26	-	HP90KB	cw no rprts/calls hrd
1908	2024	PA3BIY	26	26	HP90KB	cw c 12B 10p 2s S5

2002-12-05

0354	0409	G0CUZ	27	26	IO19BS	cw c 12B 5p 1s S5
0409	0452	PA3BZL	27	27	IO19BS	cw c 16B 14p 1s S5
0454	0603	PA2DWH	27	26	IO19BS	cw c 8B 13p 3s S5
0603	0630	PA3BIY	27	26	IO19KS	cw c 9B 8p 2s S5
1809	1838	G4FUF	27	27	IO29XJ	cw c 29B 15p 1s S5
1838	1912	DJ9YE	37	27	IO29XJ	cw c 9B 20p 6s S5
1919	1945	DK1KO	27	26	IO29XJ	cw c 12B 20p 2s S5
1953	2047	DL8GP	27	27	IO29XJ	cw c 19B 17p 2S S5
2047	2107	DL1EJA	27	27	IO39DM	cw c 14B 8p 2s S5

2002-12-06

0343	0407	DL8EBW	27	26	IO39UI	cw c 16B 16p 2s S5
0407	0437	G0CUZ	26	27	IO39UI	cw c 16B 24p 1s S5
0437	0517	PA3BIY	26	27	IO39UI	cw c 20B 31p 1s S4
0517	0612	GW4VEQ	26	26	IO39UI	cw c 7B 8p 1s S4
0634	0705	PA3ECU	26	-	IO39UI	cw nc
1809	1822	PA3BZL	27	26	IO49LJ	cw c 11B 13p 1S S5
1822	1847	G3IMV	27	27	IO49LJ	cw c 10B 9p 2s S5
1857	1915	PA3BIY	26	27	IO49LJ	cw c 9B 8p 3s S5
1915	1938	G4FUF	26	27	IO49LJ	cw c 9B 21p 2s S5
1940	1957	DK1KO	27	26	IO49LJ	cw c 20B 24p 4s S6
2000	2020	PA2DWH	27	28	IO49LJ	cw c 20B 23p 1s S6

2002-12-07

0402	0425	DH3YAK	27	27	IO49HG	cw c 6B 11p 2s S6
0429	0451	G0CUZ	27	27	IO49HG	cw c 14B 12p 1s S5
0451	0520	PA3ECU	26	27	IO49HG	cw c 19B 34p 1s S5
0542	0553	DL1EJA	27	27	IO49	cw c 5s S5@0553 15B
0624	0657	DL8GP	26	27	IO49HG	cw c 26B 38p 1s S4
1804	1825	PA0JMV	27	27	IO49II	cw c 17B 16p 1s S5
1858	1931	DL5WG	26	27	IO49II	cw c 14B 18p 3s S5
1930	2012	PA3DOL	27	27	IO49II	cw c 14B 22p 1s S5
2013	2042	DL8EBW	27	26	IO49II	cw c 18B 15p 3s S6

2002-12-08

1809	1829	DH3YAK	26	27	IO57LB	cw c 10B 14p 1s S5
1836	1838	GW4VEQ	52	52	IO57LB	cw straight Tropo
1840		G3IMV	26	26	IO57LB	cw c 19B 20p 1s S4
1928	1952	DL1EAP	26	26	IO57LB	cw c 19B 16p 2s S5
1957	2030	PA3ECU	27	27	IO57LB	cw c 11b 7p 1S s5

2002-12-09

0345	0500	LA6HL	26	-	IO57HE	cw nil
0507	0543	DL8EBW	27	26	IO57HE	cw c 14B 14p 7s S5
0545	0617	G4YTL	27	38	IO57HE	cw c 20B 17p 2s S6
1824	1857	DF8IK	27	26	IO47XF	cw c 23B 27p 2s S5
1904	1920	G4FUF	26	27	IO47XF	cw c 8B 11p 2s S5

2002-12-10

1759	1823	PA0JMV	27	38	IO46MD	cw c 11B 16p 2S S6
1826	1859	DJ9YE	27	27	IO46MD	cw c 36B 19p 2s S6
1902	1905	GM0EWX	529	529	IO46MD	cw
1909	1935	PA3ECU	27	27	IO46MD	cw c 11B 12p 2s S5
1936	1957	G4FUF	27	27	IO46MD	cw c 7B 10p 1S S5
2001	2037	DH7FB	27	26	IO46MD	cw c 13B 19p 1S S5
2040	2107	PA2DWH	27	28	IO46MD	cw c 20B 28p 2S S5
2112	2118	G4RRA	519	519	IO46MD	cw IO80BS

2002-12-11

0342	0353	PA3BZL	27	27	IO34IP	cw c 7B 15p 2s S5
0359	0413	DL5MAE	27	27	IO34IP	cw c 15B 11p 1s S5
0413	0425	DL1EJA	27	39	IO34IP	cw c 18B 30p 1s S8
0428	0444	G4YTL	38	27	IO34IP	cw c 6B 10p 6s S7
0445	0458	G0CUZ	519	519	IO34IP	cw
0509	0532	PA3DOL	27	27	IO34IP	cw c 16B 13p 2s S6
0534	0552	DL8GP	27	27	IO34IP	cw c 13B 16p 2s S5
0554	0647	PA3ECU	27	27	IO34IP	cw c 13B 33p 2s S5
1803	1837	PA0JMV	26	27	IO13XX	cw c 9B 14p 1S S4
1841	1905	G4FUF	27	27	IO13XX	cw c 5B 9p 2s S6
1909	1928	DK1KO	27	26	IO13XX	cw c 7B 10p 1S S5
1930	1952	PA2DWH	27	37	IO13XX	cw c 6B 10p 2s S5
1955	2032	DL5MAE	27	27	IO13XX	cw c 9B 5p 1s S4
2034	2050	PE1HWO	27	38	IO13XX	cw c 17B 17P

2002-12-12

1802	1834	DF8IK	26	26	IO13AX	cw c 10B 13p 1S S4
1839	1848	DL1EJA	26	26	IO13AX	cw c 7B 2p 1s S5
1854	1917	PA2CHR	27	28	IO13AX	cw c 13B 13p 1s S5
1919	1952	G0CUZ	27	27	IO13AX	cw c 13B 15p 6s S6
1953	2009	DJ9YE	27	27	IO13AX	cw c 9B 10p 2s S6
2009	2029	PA3ECU	27	27	IO13AX	cw c 7B 5p 2s S5

2002-12-13

0404	0418	G4YTL	26	27	IO04RA	cw c 10B 5p 2s S5
0446	0500	PA3BIY	26	27	IO04RA	cw c 13B 16p 1s S5
1729	1737	DL1EJA	28	39	HO93SX	cw c 8B 6P 2s S6
1740	1805	PA3BZL	28	27	HO93SX	cw c 14B 7P 3s S6
1803	1817	G4FUF	28	27	HO93SX	cw c 10B 8P 3S S8
1820	1833	PA3BIY	38	27	HO93SX	cw c 4B 7P 6s S7
1835	1858	G3IMV	28	26	HO93SX	cw c 8B 10P 3s S7
1900	1927	DK1KO	28	26	HO93SX	cw c 6B 12P 2S S6
1929	2000	PA3DZL	27	-	HO93SX	cw nc

2002-12-14

1306	1333	G0CUZ	26	28	HO93FP	cw c 10B 12P 1s S4
1335	1417	PA3DZL	26	26	HO93FP	cw c 18B 15P 1s S5
1420	1518	PA2DWH	26	26	HO93FP	cw c 15B 15P 1s S4
1518	1602	PA3DOL	26	27	HO93FP	cw c 14B 18P 1S S4
1610	1629	GW4VEQ	28	38	HO93RM	cw c 9B 13P 1S S6
1759	1822	DF8IK	26	27	HO93XG	cw c 9B 5P 1S S6
1823	1833	G4YTL	29	27	HO93XG	cw c 5B 2P 3s S8
1843	1858	PA5DD	27	38	HO93XG	cw c 10B 5P 1s S5
1903	1914	PA2CHR	28	27	HO93XG	cw c 8B 7P 2s S7
1933	1943	DK1KO	28	26	IO03CD	cw c 5B 2P 5s S8

1943	2003	G0CUZ	28	28	IO03CD	cw c 11B 13P 3s S7
2003	2013	GW4VEQ	28	28	IO03CD	cw c 10B 7P 2s S7
2025	2042	G4FUF	28	27	IO03CD	cw c 5B 6P 2s S7
2043	2051	PA3BZL	27	39	IO03CD	cw c 6B 4P 7s S8
2057	2118	PA3BIY	27	28	IO03CD	cw c 6B 2P 2s S5
2120	2153	DF7KF	27	27	IO03HD	cw c 12B 12P 5s S7
2154	2227	DL1EJA	27	37	IO03HD	cw c 21B 19P 2s S5

Thank you for a GREAT activity, Andy and for sending the log!

HA8V (KN06HT, nr. Szarvas, /p) wkd on 2m:

2002-11-19

0358	SM3VAC	JP83VA	59	59	c r ssb 1b 1809km
0702	GI6ATZ	IO74AJ	57	57	c r ssb 1b 2046km ODX
0924	LA8KV	JP52QQ	37	37	c r ssb 1b 1856km

Rig: TM255E, GS35B 900W, 4x11 el. Yagi@35m AGL. My shack is at 20m AGL on the tower! 73&55, Gabi HA8MV (2nd call HA8V).

I4YNO (JN54KP) wkd on 144 MHz:

2002-11-19

0433	ES2QHK	O29LL	38	59	c r ssb 1900km
0518	ES2RJ	KO29RJ	59	59	c r ssb 1909km

Please everybody take notice of my new email address: alex.della61@virgilio.it. The address listed in the DK3XT MS list on the Internet is wrong. 73, Alex.

LA6MV (JO59EJ) wkd on 144 MHz:

2002-11-19

0229	IW0GPN	JN62EB	27	37	1931km
0526	TK5EP	JN41IW	37	37	1943km
0612	IW2DVK/p	JN80BO	59	59	2129km
0625	IK0BZY	JN61FV	37	39	1950km
0743	I5TWK/p	JN70GR	59	59	2094km
0743	I8MPO	JN70CN	59	59	2110km

All contacts in random SSB. 73, Helge.

LA0BY in JO59IX wkd on 144 MHz:

2002-11-19

0737	F6FHP	IN94TR	59	57	1b	c r ssb 1848km
0833	YU1EV	KN04CN	59	59	1b	c r ssb 1826km
0833	YU1IO	KN04IQ	39	59	1b	c r ssb 1825km
0842	IK0BZY	JN61GW	37	59	1b	c r ssb 2010km

The astronomers managed to predict the times for the maxima also this year. However, the first maximum at about 04 UTC was clearly weaker than predicted (or hoped for). The second maximum predicted at 1030 UTC was probably there, but again quite weak, at least in Europe.

Quite annoying, I suffered from much noise and QRM. There were several stations active in the Oslo area, and some of them were not very acquainted with the operating procedures. Those were calling continuously without following any periods, and their breaks were not easy to identify. Then I had a pulsed broadband noise centered exactly on the SSB MS calling frequency (+/- 40 kHz). It blocked perhaps 50% of my receive period with S9 signals! This explains why my response was a bit slow sometimes...

I worked only 29 stations this year, but I was also searching harder for new stations/squares and calling less myself. This strategy paid off towards the East, where 5 stations from UA3 made it into the log. Thanks a lot for all contacts, guys!

My equipment was 2 x 9-ele-yagi and 180 W output power. Nice weather but freezing cold (-2 deg C) and a little windy. 73, Stefan.

OH7UV (KP33MN, 144.135 MHz, 2000lpm) wkd on 144 MHz:

2002-10-16

1900	1930	DJ8MS	27	27	6	-	2	c	
1930	1956	DL5WG	27	27	6	2	1	c	
2035	2043	DL1EJA	27	28	8	-	2	c r	
2045	2106	DH7FB	27	27	>30-		2	c r	
2110	2200	PA3ECU	27	26	>30m		1	c r	
2200	2238	PE1HWO	27	26	22	-	-	1s c	

2002-10-17

0000	0048	DL8EBW	27	28	8	12	1	c *1
0100	0200	DK5DQ-	26	3	2	-	nc	
0200	0216	DL5ME	26	26	8	3	2	c
0230	0325	DD0VF	27	27	14	5	1	c
0355	0450	DJ2QV	26	26	13	10	2	c
0500	0610	DF8IK	26	26	16	2	2	c *2
0600	0700	GW4VEQ	-	-	-	2	-	nc *3
0700	0750	LY2BIL	27	26	15	4	1	c

Remarks: *1 We observed Aurora during the qso. This might have effected also the sked before, it surely effected the qso with Nico. The CW signals were distorted if they came through. Aurora is a big obstacle for MS in the North. *2 Peter uses the missingcode effectively. *3 Thank you for the long distance try. RIG: FT225RD, 12 ele DJ9BV, BF981 Preamp, Dressler D200, DTR+.

We worked from the shack of Sanni and Timo, OH7LMQ. Thanks to both for the outstanding hospitallity with excellent food and great Sauna. Timo was a big help to serve some technical problems also (PA cooling). Thank you very much for calling us, we enjoyed to work all of you very much. We are glad about the good results outside any shower activity. QSL's via bureau or direct to OH8UV please.

73 de Markku, OH8UV and Winfried, DH3YAK.

PA3BIY (JO22EB) wkd on 144 MHz:

2002-11-18

2300	OH8K	KP55AS	27	27	c 10b, max. 3s 2090km

2002-12-13

2218	SM2CEW	KP15CR	29	39	c fsk 1817km
2325	RU1AA	KP40XD	28	28	c 1805km

73, Peter.

PA3BIY: Holidays in the Nordic countries

Here follows, here the (short) story of our trip into the Nordic countries and the QSO's that I made, between July 28 and August 18th 2002.

This holiday was the dream my wife and I had for many years: To make a tour through the Nordic countries. Our children had reached an age of 9 and 10, so they could enjoy the landscape, and did not need play in the gardens at every camping place. We traveled by car + caravan, accompanied by my parents-in-law with their car (they stayed in Hotels). My Ham gear during the trip was my home made tranceiver, the Gotting PA (8874, 400W out) and a borrowed 15 ele CuuDee from PA3FOC (tnx Rene!). I had made a simple wooden construction, in order to mount a short mast against the back of the Caravan and that worked superb. All operation was done from the car, in order to let my family members sleep during the early morning hours, hi!

We took the boat from Travemunde to Helsinki, were we arrived July 26th. In Kouvola I had a meeting with Jussi, OH5LK, and later that evening I met Ilkka, OH5IY. I know Jussi from the time he studied in PA (> 15 years ago). Ilkka has become a very good friend over the years, but we had never met in person. It was very nice to meet you both (again)!

My first Ham radio operation took place from Punkaharju area (KP41PT). I made 2 QSO's, a sked with F6HVK was nc, but I got some real big bursts from him, over a QRB of > 2200km!

In Joensuu we had a short meeting with OH7MA (Dan), before continuing to Paltamo, were we met Markku and Tanja (OH8UV and

OH8HDL. We stayed at their QTH for 2 days, and they gave us a great time! Many thanks for your hospitality, Markku and Tanja!
Contrary to some beliefs, I was NOT qrv at all during the time that I stayed in Paltamo. I just enjoyed the great weather and landscape.
From Paltamo we drove to our next destination: Rovaniemi. In Rovaniemi we met another hospitable Ham: OH9NDD and his family. As before in Finland, they were very hospitable, and invited us for an evening coffee. Prior to the holidays, I had discussed with Taavi, OH9NDD, the possibilities of a small expedition to KP27KS. Taavi had made arrangements (he drove to and fro twice (> 180 km!)), in order to check the QTH and to assure that electricity would be available.
In the afternoon of August 1st we drove to Levi Hill, and installed our equipment. The QTH was UFB, with gd take-off towards the SSW....SW, but some mountains towards the S ...SE. Still, RX1AS, RU1AA, LY2BIL and LY2SA made it across the mountains! During the night (we were outside, temp. just 6 degrees or so), I could read my notes, even in the middle of the night. Quite an experience! Because of the low temperatures during the night, Taavi and I were sometimes running around the nearby restaurant, in order to keep warm! ODX from KP27KS was PA3FOC: 2074km
Taavi had taken his 6 metre equipment with him, but there were absolutely no conditions, so no QSO's on 6, from KP27.
I was shortly QRV from KQ20ML (august 3rd), but my QTH was poor, and I noticed I set off an alarm, so had to cease my operation, sri. Only OH6MAZ was lucky enough to work me (the only QSO).
After visiting the North Cape and Tromso (were I met Aasmund, LA5TFA). My next operation (7 - 10 august) was from Andoya Island: Stave camping (JP79WE). Ingo (SM6CMU) and his wife Betty welcomed us in Andennes and guided us to the camping place. The camping is right at the sea side, but contrary to what I had expected, there was hardly any wind at all! No gales, but overcast and with +15C quite pleasant. As we stayed here for 3 nights, I made quite a nr of QSO's. Betty and Ingo stayed for 2 more days on the same camping place, before continuing with their own holidays. We met them again later!
August 10 was a long day of driving, as we made it to Pajala in 1 run: 625 km's. Pajala is near the Finish border and situated in KP17QE. The camping place was very quiet and the take-off was reasonable, with some trees in front of the antenna. I was QRV for 2 nights, but did not get the pile-up I expected. Has everyone worked KP17, or were the conditions or my QTH not good enough? Still, I managed to work several stations over 2000km, and made even some Aurora QSO's as well. Traveling more to the south I activated JP72AH as the final DX QTH.
Our last stop in Sweden was in Kungsbacka, the QTH of Betty and Ingo (SM6CMU). Again we experienced the great hospitality of the Nordic people! The weather gives us the impression that we drove the wrong way, into the mediterranean, in stead of the North! Since we left Andoya Island, the temperatures have been between 20 and 30 degrees, with lots of unbroken sunshine. And... very few mosquitoes!
Thanks again to all the Nordic radio Hams that we've met, showed us around, had a drink with us or served us a great meal!
When we past the German Dutch border we were greeted with torrential rains! Welcome back in PA...
Here an over view of the QSO's I've made:

2002-07-28 OH/PA3BIY, KP41PT

2000	2100	PA5DD	26	26	c 4s

2002-07-29 OH/PA3BIY, KP41PT

0310	0400	F6HVK	37	-	nc 15s+2s 2222km
0400	0450	DG5CST	37	27	c 8s

2002-08-01 OH/PA3BIY (with OH9NDD), KP27KS

2105	2135	RX1AS	27	27	cr 3s
2135	2220	LY2BIL	27	26	cr abt 2s
2222	2235	RU1AA	27	27	cr 1s
2250		SM2CEW	579	599	KP15 Tropo
2252	2320	LY2SA	37	26	cr 6s

2002-08-02 OH/PA3BIY (with OH9NDD), KP27KS

0000	0025	DH3YAK	27	26	c 2s
0032	0115	PA3ECU	26	27	c 2s
0137	0240	PA3FOC	27	27	c 1, 2+19s ufb!
0250	0400	PE1HWO	27	-	nc refl. became vy poor
0410	0435	DL5ME	27	27	cr 3s
0440	0502	LA0BY	27	27	cr 1s
0505	0525	DL7FF	27	-	Called me, then gone...
0530	0555	LA6HL	27	37	c 1s

2002-08-03 LA/PA3BIY, KQ20ML

1925	2005	OH6MAZ	27	26	c 10s S9+ Vy strong refl!

2002-08-07 LA/PA3BIY, JP79WE

2132	2145	OH5IY	28	27	c 8s, UFB refl, Ilkka!

2002-08-08 LA/PA3BIY, JP79WE

0300	0400	DL8EBW	26	26?nc	
0400	0500	DH3YAK	26	26	c 2s 1985km
1910	2015	DH7FB	27	27	cr 1s, QRM final r at 2014z
2020	2050	RX1AS	39	27	cr 14s S9+
2050	2100	RU1AA	29	28	cr 3s S9
2100	2210	LY2SA	27	26	cr 3s
2205	2225	OH6MAZ	37	26	cr
2225	2250	LY2BIL	38	39	cr 10s

2002-08-09 LA/PA3BIY, JP79WE

0400	0520	OH9NDD	26	26	c 5s (BS to the ocean!)
1915	2020	LA0BY	27	27	cr 6s
2020	2135	DL5ME	27	26	cr 3s
0300	0400	PA2DWH	26	-	nc
0400	0505	DL8EBW	26	26	c 18s (Rogers!) 2042km

2002-08-10 LA/PA3BIY, JP79WE

0500	0610	DK5DQ	36	26	c 32s! 1996km

2002-08-11 SM2/PA3BIY, KP17QE

1100	1200	PA2DWH	26	26	nc 40s slow speed
1210	1235	PA5DD	27	26	cr 16s 1960km
1250	1310	RU1AA	37	26	cr
1310	1335	RX1AS	39	27	cr 30s S9
1957	2055	LY2BIL	27	28	cr 2s
2100	2200	OK1UAK	-	-	nc 1 ping
2200	2300	Gave CQ, no answer, AURORA attenuation?			

2002-08-12 SM2/PA3BIY, KP17QE

0300	0400	PA3ECU	26	27	nc 25s
0400	0440	G4YTL	-	-	nil
0500	0530	LA6HL	-	-	nil QRV?
0530	0600	DJ8MS	-	-	nil QRV?
0600	0700	PA2CHR	26	27	nc hrd DJ8MS, sri, no time
0700	0730	DF8IK	-	-	nil
0830	1000	PA3BZL	27	27	77s! ufb refl, BZL high noise
1030	1100	PA2DWH	26	37	nc 8s good refl
1100	1150	DH3YAK	27	26	c 1s 1921km
1200	1300	G4HGI	27	27	nc 12s No rogers 2062km
1300	1400	DL3HRT	27	27	nc 1s No rogers
1400		OH9NDD	57	57	Tropo
1400	1500	DF1BN	27	26	nc 2s No rogers
1525	1625	PA2DWH	27	26	c 1s
1805	1850	DL1EAP	27	27	c 1.5s 2024km
1900	1940	HA5OV	-	-	nil
2000	2040	DL5WG	26	27	c 25s
2100	2150	HB9FAP	-	-	nil >2300km
2200	2230	PA9KT	27	38	cr 115s UFB refl!
2235	2200	LA6HL	37	37	cr 15s
2300	2330	UT5ER	-	-	nil

2002-08-13 SM2/PA3BIY, KP17QE

0300	0400	PE1HWO	26	26	nc Vy poor refl
0400	0500	PA3FOC	27	26	nc 20s (later I found my PA had a problem during this night: only 100W out!, sri....)
0500	0600	DF2ZC	-	-	nil
0600	0630	ON4AMX	-	-	nc 1p
0700	0800	DK5DQ	28	47	c 5s 1933km

I also made some Aurora QSO's:

1530	OH7UE	55A	55A	KP52EL
1535	OH6MAZ	59A	55A	KP21IG
1545	SM2DXH	55A	55A	KP03CU
1549	OH8NXE	55A	55A	KP25SB
1605	RU1AA	55A	53A	KP40XD
1605	SM3VAC	55A	57A	JP83VA
1622	RX1AS	57A	55A	KO59FX
1630	UA1AFA	55A	53A	KP50EJ

2002-08-16 SM3/PA3BIY, JP72AH

2100	2135	DH7FB	28	27	cr 3s S9
2138	2210	DF8IK	39	27	cr 7s S9
2212	2230	PA5DD	27	27	cr 2s
2230	2250	DD3SP	27	27	cr
2255	2325	PA2DWH	27	27	cr

2002-08-17 SM3/PA3BIY, JP72AH

0500	0520	PA3ECU	37	27	c 6s
0522	0537	PE1HWO	27	27	c 15s
2217		LA0BY	529	529	Tropo

2002-08-18 SM3/PA3BIY, JP72AH

0500	0510	PA3FOC	27	27	c ufb refl!
0520	0540	PA3DOL	26	27	c 2s

Well, that's the story and the QSO's I've made. I tried to find the locations that were possible for a caravan and a small family, but I know they may have been better in some instances. When I got home, I found out that some Hams thought this was a fully sponsored Ham expedition. Sorry guys, it was a holiday, with some Ham activity included... Anyway, I hope I have given some Hams a new sqr and some fun! Best 73's, Peter, PA3BIY (Ed.: Mni tnx for the nice report!!)

RK1B - Quadrantids 2003

Hi Ping jockeys! During the last big shower we made a little expedition to KO49WN, RU1AS summer cottage, to try if meteors can fly also in freezing wx. 2003-01-02 At home square KP41KL was -34°C when startet trip to KO49. But the diesel didn't congeal so my van worked and late evening after passing the border and St. Petersburg we arrived KO49WN. Nearly at the cottage, just the last 100 meters, the road was not open. But with a shovel we also fixed that problem in one hour.

Inside the cottage the temperature was just -21°. That was warm compared to the -28°C outside... But with bottled gas heaters and electric heaters there was enough temperature for living. At the evening we tested to operate but without any result.

2003-01-03 The next morning was warm enought to get out of the bed. We tried to work MS but again without results. The reason was easy to understand: The antenna was covered with ice... Igor, RZ1AP also visited our qth. He was a great help because we had several outdoor things to do ;-) So we took the tower down (just 10m high) and cleaned the 10el Yagi. That's a nice work when the temperature is around -25°C and a weak wind blows! After that we made also little bit firewood for the sauna and about 100kg wood for the central heating boiler in the cottage. But after all it was time again to look for meteors ;-)

Our setup was an IBM 166MHz notebook, ICOM IC-706 with GI-7b PA and a 10el Yagi with 6m boom. Our log was small but even something. And as you see, the sauna was hot enought!

2003-01-03 RK1B, KO49WN, wkd:

1245	1305	PA0BAT	JO32JF	26	27 c
1352	1405	PA0JMV	JO21PM	26	27 c
1418	1424	DJ3LE	JO44TN	26	27 c
1435	1510	ON4ARF	JO10MV	26	27 c
1528	1537	OZ2TP		26	27 c
1540	1640	PA3BIY	JO22EB	-	- nc
1705	1722	DJ8MS	JO63CT	26	27 c
1723	1802	ON4ANT	JO20AR	-	- nc
1802	1902	SAUNA			
1917	1955	DH5FS	JO61UA	26	27 c
2018	2040	DL6ZAU	JO40JF	26	26 c
2135	2218	PA3BIY	JO22EB	26	27 c

After that no complete QSOs, it seems that only poor rocks are in the air. We stopped TX 0100 UTC.

2003-01-04 At the morning we loaded all things into the car and drove back to OH. When I was back at home it was time to look into the cluster but and I don't thing do I have to smile or cry, or am I just too old-fashioned, because to me it's not easy to understand comments in cluster like "PSE QTF 235 tnx / Nice refl. I'm calling U / CQ 160ms 6db I call...". We informed earlier that we don't use DX cluster, and all qsos will be made via radio because we operate random, not via cluster assistant... But shit happens...

IDEAS... During this winter picnic we had also several plans for next summer (as usual, let's see what we'll do...) expedition with two setups, one for HSCW and a second for WSJT, BUT 30 second periods are short for HSCW when using DTR (decoding information and start next record), and if I think what WSJT can decode in 2,5 minutes... When driving two transceivers in one QTH, of course they have to use same TX and RX time if you want to hear anything. So I think one minute periods will be a good compromise. Up here in the north it's no problem, but how RX/TX periods will go in some rush VHF areas after that...? I'm interested to hear your comments. But where we have to go next? We will look into DL8EBW's MWS 2003 when it's ready.

And about OH squares, if you need some new in 6/2m MS or live closed to OH so maybe also 6/2/0.7/0.23 meter tropo is possible pse click that what you need on my website http://www.saunalahti.fi/oh5lid/cgi-bin/grids or if you are used that earlier don't forget to update your information after work new squares. Thanks!

QSL ok via buro, that's why we have a great worldwide buro system made. 73 de Janne, OH5LID & Alex, RU1AS

S53VV (JN65UM) wkd on 144 MHz in SSB:

2002-11-19

0558	RZ6BU	KN84PX	59	59	c 1b 1839km
0623	EI2CA/p	IO43	27	38	c 1b >1900km

Rig: 250W and 16el LY @ 75m asl. See You in next shower or on Sporadic Meteors. Skeds HSCW, FSK441 or SSB are much appreciated. 73, Stane.

UR5LX (KO70WK) wkd on 144 MHz:

2002-11-19

0322	I4XCC	JN63GV	59	59	1896km
0424	G4LOH	IO94IA	26	-	2530km
0735	DG7TG	JO43TX	59	59	1819km
0736	DL8EBW	JO31DL	59	59	2060km
0743	DL1EJA	JO31DS	59	59	2055km
0743	DL6BF	JO32QI	59	59	1974km
0744	DB4ET	JO31	59	27	
0750	DL4FCS	JO40HG	59	59	1921km
0752	DG5YIL	JO32KB	59	59	2011km
0753	DJ9YE	KO70WK	59	59	
0753	DG6JF/p	JO32?	59	59	
0753	PA3DAL		59	59	
0841	HB9FAP	JN47GJ	27	27	2012km

0842 DK9NCX JN59BT 59 59 1826km
0851 DG7TG JO43TX 59 59 1819km
0910 HB9FAP JN47GJ 59 59 2012km
All qsos 1-burst SSB. Rig: FT-736, MGF180, 14x12 VE7BQH, 1500W. QSL SASE: Sergej L. Lysenko, s.lwashki, r-n Zolochev, obl Kharkov, Ukraine 62211. 73, Sergej.

UT5ER (KN78ER) wkd on 144 MHz:

2002-11-18
0800 OH8K KP55AS 27 26 3 4 3 c 1911km
2002-11-19
0439 DL8EBW JO31NF 59 59 - - - c s 1955km
Rig: FT-847, 500W, 4 times DJ9BV-4,4-Lambda. 73, Arkady - ut5er@alice.dp.ua or SMS 380677378202@2sms.kyivstar.net.

YM3XC (KN30FC) wkd on 144 MHz:

2002-11-18
2317 S51AT JN75GW 27 27 cw
2352 S57TW JN75EX 27 27 cw
2002-11-19
0000 DD0VF JO61WB 37 37 cw
0024 IW2HAJ JN45NO 39 39 ssb
0038 I1JTQ JN35UB 27 27 ssb
0038 I4XCC JN63GV 27 27 ssb
0038 HA8CE KN06EN 38 38 ssb
0040 HA6NY JN98WC 27 27 ssb
0107 IK1PAG JN35SB 27 27 ssb
0107 I1DMP JN35UB 59 49 ssb
0107 S51MQ JN75NT 27 27 ssb
0107 I1JTQ JN35UB 37 37 ssb
0108 DL2IAN/P JN49BC 28 39 ssb
0108 DL3IAE/P JN49BC 39 39 ssb
0108 HA5PT JN97MM 59 59 ssb
0108 OM3TZZ JN88SI 59 39 ssb
0108 DH7FB JO62SM 59 59 ssb
0111 DJ9YE JO43HV 28 59 ssb 2032km
0111 PA9RX JO32MT 48 48 ssb 2039km
0135 DL8EBW JO31NF 48 29 ssb 1935km
0136 ON7CL JO20JU 37 37 ssb 2056km
0215 OK2BRD JN99ET 48 48 ssb
0215 IW2BSQ JN45OL 37 37 ssb
0222 LZ1KWT/P KN22KT 59 59 ssb
0222 YU1EV KN04CN 37 37 ssb
0222 IK7MCJ JN80QJ 59 59 ssb
0222 OE3MSW 39 39 ssb
0230 S55AW JN75DJ 37 37 ssb
0232 IK2YXK JN45OP 39 39 ssb
0258 DL5GAC JN47UT 59 59 ssb
0258 I2FAK JN45OB 59 59 ssb
0301 IW2BNA JN45NN 37 59 ssb
0304 IW1AZJ JN35UB 37 27 ssb
0317 ON4AMX JO40FB 37 37 ssb
0338 S53VV JN65UM 37 37 ssb
0359 DL5WG JO52VK 37 27 ssb
0404 HA6NQ JN98WA 27 27 ssb
0406 IV3CWI JN66OC 59 59 ssb
0406 9H1CG JM75LL 59 59 ssb
0406 IV3DXW JN65QQ 59 59 ssb
0406 OK1KT JO70WE 59 59 ssb
0419 S57A JN65TW 38 59 ssb
0420 DL6YCY JO41CU 48 37 ssb 1912km
0424 DF7KF JO30GU 37 36 ssb 1948km
0427 HB9Q JN47CG 37 59 ssb
0435 PA3DOL JO22MT 38 39 ssb 2150km
0440 9A3PA JN85EG 59 59 ssb
0440 S54G JN65TM 38 57 ssb
0440 SP2OFW JO93AC 59 59 ssb
0441 OE6IWG JN77PK 48 39 ssb
0441 HA7UL JN97KK 48 59 ssb
0442 S50C JN76JG 48 59 ssb
0449 IW2DVK/P JN80BO 26 39 ssb
0449 IV3HWT JN65ST 59 39 ssb
0454 PA2CHR JO22XA 59 27 ssb 2050km
0456 YU7EW KN05HP 59 59 ssb
0456 IZ1EPM JN35 59 59 ssb
0457 9A3JH JN75AD 59 59 ssb
0501 IK0BZY JN61GW 59 59 ssb
0502 DH3VE JN39KK 37 37 ssb
0503 DL1KDA JO64OC 37 27 ssb
0503 HA5CW KN07SU 48 39 ssb
0503 DL5MAE JN58VF 59 59 ssb
0504 OK2ZW JN89HI 59 59 ssb
0504 HA5OV JN97NJ 59 59 ssb
0506 HA5CBA JN97 37 59 ssb
0506 HA8V KN06 59 59 ssb
0510 DF0HF JO50VF 59 59 ssb
0512 ON4LN JO20IV 37 37 ssb 2064km
0515 F6FHP IN94TR 59 59 ssb 2250km
0523 DK3WG JO72GI 59 38 ssb
0524 S51ZO JN86DR 48 28 ssb
0525 PA0JMV JO21PM 59 59 ssb 2061km
0525 DK5YA JN49NX 59 38 ssb
0525 PA3BZL JO22JB 59 59 ssb 2121km
0530 OE1SOW JN88FF 37 37 ssb
0536 OK1KDZ JN69XP 37 37 ssb
0538 DL5ROB JN68HG 59 59 ssb
0550 OE3NNN 59 59 ssb
0550 OK1KRY JN69SU 59 59 ssb
0553 DJ9KV JN68OK 37 59 ssb
0559 DJ9KV JN68OK 48 48 ssb
0705 IK1EGC JN35UF 28 39 ssb
All random. Crew: HB9DUR, Andrea, TA1E, Aziz and TA1CGI, Baris. Rig: TR751, GI7b H.M 300W, SP2, 17B2. QSL are printed and will be sent by march 03. When I reached the island to collect my equipment, I found the HV transformer of my hm PA broken. Fortunately, with lots of luck Aziz managed to find a shop in Canakkale where it had been repaired. All 4 secondary windings were completely re-winded and we picked it up at 2100 the evening of the 18.11, so just before the peak!
The antenna has been installed on top of the emergency exit at about 18m above ground; what a hard job to erect it! Anyway, we had fun and did not sleep very much as usual and we look forward to activating this square again. I have felt the incredible pile up and the operation has been exciting like during the expedition to KM29 in 1999. I have also noticed that after 0559 UTC almost nobody was qrv or calling me. I believe this was due to QRL, not to MS conditions?
Comment to the shower: I don't know 2001 condx since I has been QRV,but my impression was that there were several groups of reflections and then nothing for abt 20 minutes.
By the way, some people in a departement within the University of Canaccale (TA3XC) are interested in running test in WSJT on permanent base for research purpose with partner stations in Europe. Anybody interested?
Thanks to the University of Canaccale and to Baris. Special thanks to the vice-rector Prof Dr. Mr. Osman Demircan that made this activity from a very rare square come true. Best 73 Andrea, HB9DUR

YU7EW (KN05HP) wkd via Leonids 2002:

2002-11-19 (1 burst SSB)
0357 RA4AOR LN29LA 59 59 c 1b ssb 1865km

Meteor Shower Calendar

by Guido Jünkersfeld, DL8EBW

April to June 2003

Name	Date	Max.	ZHR	RA	DEC	v (km/s)	Source
ursa-Majorids	01.04.-02.04.		20				BMS50
beta-Pavonids	11.03.-16.04.	07.04.	13	308	-63		5IY97
April-Piscids	08.04.-29.04.	20.04.	low	007	+07		IMO03
Lyrids	**16.04.-25.04.**	**22.04.**	**15**	**271**	**+34**	**49**	**IMO03 *1**
pi-Puppids	15.04.-28.04.	24.04.	var.	110	-45	18	IMO03
delta-Piscids	24.04.-24.04.	24.04.	low	011	+12		IMO03
alpha-Scorpids	16.03.-12.05.	03.05.	10	240	-27		5IY97
eta-Aquariden	**19.04.-28.05.**	**06.05.**	**60**	**338**	**-01**	**66**	**IMO03 *2**
Halleids	**03.05.-21.05.**	**08.05.**	**25**	**338**	**-01**		**BMS50 *2**
Piscids	06.05.-10.05.	08.05.	30	012	+19		BMS50
epsilon-Arietids	24.04.-27.05.	09.05.	low	044	+21		IMO03
nu-Piscids	11.05.-14.05.	12.05.	20	016	+27		BMS50
May-Arietids	04.05.-06.06.	16.05.	low	037	+18		IMO03
Sagittarids	15.04.-15.07.	20.05.	5	247	-22	30	IMO03
o-Cetids	05.05.-02.06.	20.05.	14	028	-04		IMO03
nu-Scorpiids	19.05.-20.06.	25.05.	9	261	-37		BMS50
eta-Pegasids	20.05.-09.06.	31.05.	9	333	+27		BMS50
alpha-Scorpiids	01.06.-17.06.	05.06.	15	251	-22		BMS50
lamb.-Sagittariids	04.05.-09.07.	8.-15.06.	12	275	-25		BMS50
Arietids	**22.05.-02.07.**	**07.06.**	**60**	**044**	**+24**	**37**	**IMO03 *3**
zeta-Perseids	**20.05.-05.07.**	**09.06.**	**40**	**062**	**+23**	**29**	**IMO03 *3**
Ophiuchids	19.05.-02.07.	10.06.	20	269	-23		BMS50
June-Lyrids	11.06.-21.06.	16.06.	5	287	+35		5IY97
gamma-Draconids	.June-Sept.	17.06.	4	269	+48		BMS50
Lyrids	12.06.-21.06.	17.06.	8	282	+44		BMS50
Taurids-Perseids	25.06.-20.06.	18.06.	10	054	+31		BMS50
Sculptorids	10.06.-27.06.	25.06.	8	005	-35		BMS50
54-Perseids	22.06.-30.06.	26.06.	30	068	+34		BMS50
Corvids	25.06.-03.07.	26.06.	13	192	-19		BMS50
beta-Taurids	05.06.-17.07.	28.06.	24	086	+19		IMO03
Sagittariids	07.06.-18.07.	30.06.	8	285	-25		BMS50

Kommentar / Comments: *1 Der Lyriden-Schauer ist sicher als der erste gute MS-Schauer nach drei Monaten Abstinenz zu beurteilen - leider waren die Ergebnisse der letzten Jahre nicht besonders gut, aber der Anstieg der Reflexionen ist deutlich spürbar. – First good shower since Quadrantids
*2 Der Zeitraum 3.-12.Mai ist für Meteorscatterfreunde und dies speziell in den südlichen Breiten mit eine der guten Zeiten im Jahr. Tatsächlich können in den eta-Aquariden gleiche Weiten erzielt werden wie bei den Leoniden! DH3YAK/DL8EBW ziehen dieses Jahr aber mal in den Norden...
- Good shower for southern latitudes with QRB-possibilities like during the Leonides.
*3 Obwohl es im Zeitraum Anfang Juni nicht soweit geht, bestechen diese Schauer aber durch die Häufigkeit der Reflexionen - teilweise kommt es durch die Überlappung von Radianten von bis zu mehr als 60-80 Meteoriten pro Stunde (ZHR). – Max. QRBs are lower but plenty of reflections possible due to overlap of radiants from different good showers. (60-80 refleections per hour).

Legend / Erklärungen ZHR: Numer of meteors per hour during the maximum
More explanations see DUBUS 4/2002, page 89.

Suggestions and comments please to: DL8EBW@t-online.de

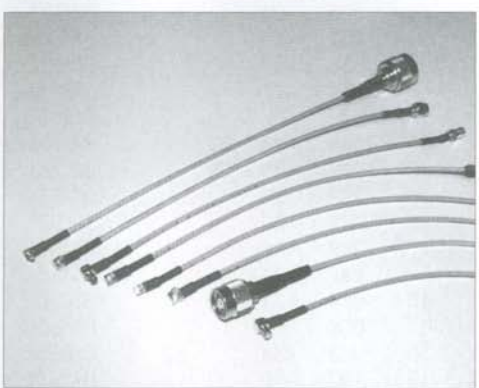
New Products

Editor: Joachim Kraft, DL8HCZ

Neu bei UKW-Berichte

Adapter ohne Ende...

Neu bei UKW-Berichte gibt es eine Reihe kurzer Adapter-Kabel, auch „Pigtails" genannt. Damit können auch etwas exotische Steckverbinder wie MCX, Reverse-TNC, MMCX und Lucent angeschlossen werden. Diese Adapter-Kabel sind ca. 20 cm lang und mit Teflonkabel RG 316 ausgeführt. Mit ihrer Hilfe können die oft sehr kleinen Steckverbinder auf gängige Steckernormen adaptiert und dann verlustarme, dickere Koaxkabel verwendet werden. Die Preise für diese „Pigtails" liegen zwischen EUR 32.- und 54.- und sind zu beziehen bei: UKW-Berichte, Fachversand für Funkzubehör, Eberhard L. Smolka, Jahnstr. 7, D-91083 Baiersdorf, Tel. 09133-77980, Fax 09133 779833 eMail: ukwberichte@aol.com www.ukw-berichte.de



Exotic Adapters available from UKW-Berichte
More info: www.ukw-berichte.de

Neu von SSB-Electronic: Breitband-Vorverstärker *LNA 5000*

Hochwertige Technik in edelster Form gibt es wieder von SSB-Electronic: Ein modernes SiGe-Verstärkerchip auf einem verlustarmen Keramik-Mikrowellensubstrat und der Einsatz von Mikrostrip-N Buchsen ermöglichen eine niedrige Rauschzahl bei gleichzeitig hoher Verstärkung über eine Bandbreite von 5 GHz.
Das hervorragende Großsignalverhalten des ***LNA 5000*** wird durch einen IP3 >30 dBm belegt. Intermodulationsstörungen durch hohe Summensignale von größeren Antennen sind nahezu ausgeschlossen.

Der LNA 5000 von SSB

Damit klassifiziert sich der ***LNA 5000*** als Allround-Verstärker für viele Anwendungen, sei es als Vorverstärker für Scanner, Empfänger oder zur Empfindlichkeitsverbesserungen von Meßsystemen. Aber auch als Kleinleistungsverstärker kann der ***LNA 5000*** mit einer linearen Ausgangsleistung von bis zu 20 dBm nützliche Dienste erweisen.
Der Verstärker kann Direkt- oder über das Koaxkabel ferngespeist werden, die Versorgungsspannung wird dabei intern stabilisiert.

Technische Daten	**LNA 5000**
Frequenzbereich:	50 – 5000 MHz
Impedanz:	50 Ohm
Verstärkung/Rauschmaß (typ.):	
@ 200 MHz	20/1.9 dB
@ 500 MHz	25/2.0 dB
@ 1000 MHz	23/2.0dB
@ 3000 MHz	16/2.8dB
Buchsennorm:	N-weiblich
Betriebsspannung:	10 - 20 V
Stromaufnahme bei 12 V:	65 mA
Gewicht:	500 Gramm
Max. Mastdurchmesser:	58 mm

Dank des wetterfesten Außengehäuses kann der ***LNA 5000*** direkt am Antennenmast befestigt werden. Die Mastschellen sind feuerverzinkt, alle Schrauben und Muttern sind aus Edelstahl.
Empfohlene Fernspeiseweiche: DCC-5000.

Der LNA 5000 kostet 168 Euro, die Fernspeiseweiche DCC 5000 kostet 58 Euro, alle Preise incl. Mwst. Bezug: SSB Electronic GmbH, Handwerkerstr. 19, 58368 Iserlohn, Tel.: 02371/9590-0, Fax – 20, email: info@ssb.de www.ssb.de

Broadband LNA 50 – 5000 MHz from SSB-Electronic. More info in the web: www.ssb.de

Experimental Methods in RF Design

Another great book was published from the ARRL that might be of interest to those of you building analog front ends for Linrad.

It is the ARRL's "Experimental Methods in RF Design", by Wes Hayward, W7ZOI, Rick Campbell, KK7B, and Bob Larkin, W7PUA.

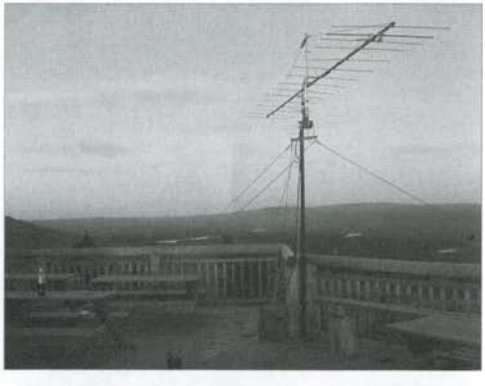
It has 12 Chapters on 512 pages titled:
Getting Started
Amplifier Design Basics
Filters and Impedance Matching Circuits
Oscillators and Frequency Synthesis
Mixers and Frequency Multipliers
Transmitters and Receivers
Measurement Equipment
Direct Conversion Receivers
Phasing Receivers and Transmitters
DSP Components
DSP Applications in Communications
Field Operation, Portable Gear, and Integrated Stations

There is also a CD ROM
It has loads of helpful information including sentences like:
"Mini-Circuits +7dBm mixers are specifed for an input 1 dB compression power of +1 esBm. A rule of thumb states that the input intercept of a diode mixer is 10 to 15 dB above P(-1dB), plac-ing IIP3 at +11 to +16 dBm. These values are inline with our measurements for the TUF-1 and SBL-1".

And

"Most mixer manufacturers also build mixers specified for LO power of +17 dBm. These mixers usually use 2 series diodes in each leg of an otherwise conventional ring. Once example, the TUF-1H, has a +14 dBM value for P(-1db), placing IIP3 at +24 dBm or higher".
It also discusses the importance of proper termination at all frequencies, gives examples, suitable amplifiers, references, etc...
The oscillator chapter has a section on "Noise in Amplifiers":, with subheadings of "The Effects of Phase Noise", and "Designing Quiet Oscillators". They use the K7HFD oscillator as an example of a low phase noise high power amplifier (+17 dBm at 10 MHz). At 10 KHz from carrier this has -156 dBc/Hz noise.
The section on Direct Conversion Receivers gives a very good discussion of the practical difficulties of building one at VHF frequencies, with an extensive discussion of the cures for and consequences of LO leakage, for example.
The Section on DSP is outstanding as well.
The book can be purchased via the ARRL website http://www.arrl.org. The price for the U.S. is 49.95 USD.
(tnx to Roger, W3SZ, for this info!)

If you have knowledge of any product that could be of interest for all DUBUS readers, please let us know! Of course, it should be useful for the VHF/UHF or microwave amateur.
DUBUS@web.de



OH9/PA3BIY Take Off from KP27KS

News & Comments

Editor: Joachim Kraft, DL8HCZ

- Dates

25th Nordic VHF Meeting June 2003

With this we have the pleasure of inviting you to the annual Nordic VHF/UHF/SHF-meeting, this time the 25th anniversary, so perhaps some surprises will show up.

We have booked the weekend 6. – 8. June 2003 at Hotel Gavelstad - http://www.hotellgavelstad.com (JO49XI). All rooms have shower/WC and television.

Location is about 45 km north from Larvik (ferry from OZ) and Sandefjord (ferry from SM6) on Road no. 40 to Hvittingfoss and Kongsberg.

For more information and reservations, please visit internet: http://www.qsl.net/la3r

ACCOMMODATION AND MEALS

Indoor accommodation is available for about 90 persons in rooms with 3 or 4 beds. In addition we can make reservations at a Guest Farm close to Hotel Gavelstad, which will be very suitable for families.

No kitchen is available for preparation of your own meals.

We will serve all meals at reasonable prices.

The program will be as usual with lectures, flea market, barbecue and NRAU open VHF-managers meeting.

A caravan park (without electricity) will be available, and if you prefer to sleep in a tent, that will also be possible.

Those who want to use caravan/tent can use shower/WC in the hotel. Please bring your own sleeping bag or bedding and towels.

Prices: Indoor bed, one night NOK 250

Caravan or tent, one night NOK 50

Friday evening barbecue NOK 70

Breakfast NOK 70 Lunch NOK 100

Saturday Ham-dinner NOK 250

Discount price (bed Fri. – Sun. + all meals) NOK 900

Discount price (tent/caravan Fr-Sun. + all meals) NOK 600

Lunch on Sunday is not included in discount prices.

Reservations: Please visit our above internet address and fill in the reservation form or send your reservation to LA1BR: Fax: +47 623 63592 -snail mail: Helge Karlsen, Hersethøgda 149, NO-2355 Gaupen. 73 de Helge, LA1BR

Southeastern VHF Society Conference 2003

The Southeastern VHF Society invites you to join us in Huntsville, Alabama April 25 & 26, 2003 for the Seventh Annual Southeastern VHF Society Conference.

The conference will be held at the Huntsville Marriott, 5 Tranquility Base, next door to the US Space and Rocket Center. Mention the SVHFS Conference when calling the Marriott Reservations Department, toll free, at (888) 299-5174 on or before the cut off date of April 3, 2003 in order to receive the special rate of $75.00 per night single or double. The local phone number for the hotel is 256-830-2222, the FAX number is 256-895-0904.

As in years past, we will have an exciting program with presentations from accomplished VHF+ amateur radio enthusiasts from around the country. We will also have antenna gain measurements (including the 1296 back scratcher competition), pre-amp gain and noise figure measurements, the Friday evening flea market with vendor displays, the Saturday afternoon auction, and of course, the Saturday evening banquet, which is open to everyone. Drawings for the notoriously enviable door prizes will follow the banquet.

New this year is a FREE surface mount technology soldering workshop for Friday (time to be announced). Steve Costro N2CEI of DEMI has graciously offered to conduct the workshop. It will be "hands on" with a chance for the participants to learn and practice proper techniques for soldering SMT devices. The class is limited to 15 participants on a first come first served basis.

We will also be having a 1296 homebrew antenna competition based on the "Mouser Electronics" back scratchers that were given out at the 2002 Conference Banquet. Gain will be confirmed on the 2003 Conference Antenna Range. Rules for the competition are posted on the website.

Dick Hanson K5AND is our Program Chairperson for the conference. He can be reached via k5and@adelphia.net .

Our website has been just been updated and the registration form is now available. If you register in advance by April 3rd you will be eligible for our advance registration prize drawing. The advance registration prize is a new Bird Wattmeter courtesy of Bird.

For further information and updates please check the SVHFS website at http://www.svhfs.org/

Greg Robinson, KB4NVD, Rover@wireco.net

SVHFS Conference Publicity Chairperson

Weinheim Meeting 2003

The date for the VHF Meeting in Weinheim / Germany will be **August 30./31. 2003**. This is a very early date compared with the years before. So please make a note in your diary. The meeting will take place at the same place like in 2002, the fomer "Mult-Schule".

EU 6m DXers Summit & BBQ? No!

The discussed event originally planned for the end of May 2003 by PA2VST, SM7SJ and DL1EJA will not take place in 2003. There were problems with the location. PA2VST will try to organize a meeting for 2004.

Anyway there will be (again) a 6m DXer meeting during the Ham-Radio exhibition in Friedrichshafen on June 28th.

Seigy Meeting 2003

The French Microwave Meeting in Seigy will take place on April 5th and 6th 2003. The exact address is Salle de Fêtes de Seigy in dpt 41 (Loir et Cher) between Tours and Vierzon. There will be probably some conferences (program unknown up to now), preamp measurements (f6eti, f5fln) Microwave meeting and flea market. (tnx F6HYE)

- Expeditions and Activities

Expedition to JP43 and 33

DH3YAK, DL8EBW, LA4XGA and LA7DFA will be qrv as LA6K from JP43 from May 2 to 5 and JP33 from May 6 to 7 via HSCW, SSB and FSK on 2m..

OH8K: Where do we go next?

OH8K wants your assistance in planning their 2003 DXpeditions. OH8K is planning for 3 to 4 DXpeditions this year, and will give an opportunity to all serious MS square hunters to have an real effect on their DXpedition plans. Please check with OH8K's DXpedition page and vote where you want them to go next! Station's QRB to the wanted square must be below 2250km. Aulis, oh6jw@nic.fi

Expedition to KP51 in June

OH5LID will be in KP51 during the Arietids 2003.on June 7th. OH5LID will work only Random WSJT during this trip. More info later. Janne oh5lid@saunalahti.fi

Summer 2003: Lebanon on 2m

Pavel, OD5/OK1MU, will go back to OK after some years in OD. He will make his final effort on 2m from May to the end of July in order to catch any possible sporadic E opening towards Europe. Rig: 100 w and 9 ele yagi. His locator is KM73. Pavel is also qrv on 6m.

Mauretania on 2m and 6m

DL8YHR, Frank, has announced an expedition to Mauretania from June 27th to July 7th. Frank will be qrv with QRO on 6m and 2m. He will try also EME (144.070). Locator is IK28. and call 5T6M. Frank is also looking for Tropo partners in NE Brazil on 2m. QSL Manager is ON4ANT.

Gibraltar on 2m

ZB2/G0NFA and G0WYF will be qrv for 2 to 3 days in the first half of June on 2m with a 13 ele yagi. On the way the will be qrv mobile from different locations in EA and France.

Mauritius activity in March

From March 9th to 23rd there will be a group qrv from 3B8, Mauritius (Loc. LG89) on 6m, 2m and 70cm. Also EME is planned. OPs are ON4ANT, DH5FS, ON4AME etc.

LA/DK5KK qrv 6m and 2m in June

Matti, DK5KK will be qrv from northern LA from June 5th for about 3 weeks. He will activate several northern squares (e.h. JQ90) on 2m via MS and also on 6m.

Bermuda on 2m and 6m

There will be 2 expeditions to Bermuda this summer: From June 13th to 16th there will be N0JK/VP9 qrv on 6m and 2m. From June 27th to July 5th there will be W3CMP/VP9 qrv on 2m and 6m with QRO and long yagis antennas. Chris is very interested in 2m transatlantic attempts toward Europe and is looking for partners. W3CMP@aol.com

2m TEP attempts from Southern France

Paul, F6EGV, located in Menton, JN33RT, is planning daily CW transmissions during equinox from 20/02 to 20/04 between 19.30 and 21.30h (transmitting every 10mins) on 28.055 and 144.055 MHz beaming ZS/V51 for TEP. (Michel, F6HTJ

PA3HEN/MM

Theo, PA3HEN/MM, plans to be qrv again from rare squares on 6m + 2m during the summer.

G0KZG/MM

Andy, G0KZG/MM, plans to be qrv again on 6m and 2m from October on a trip from CT to PY.

JW on 70cm EME

SM2BYA still plans to become qrv on 70cm EME from Svalbard with the big EISCAT dish for 2 days during summer 2003. Earliest date could be in May.

US Group looking for EU-QSO partners for 2m Trans-Atlantic Attempt

I am heading up a group to go for the 'Cup'. The group call is W3DOV and the three of us are, Larry (K3LT), Sonny, 'Zed' N3FZP, and myself (KE3UY). We are still in the design and building stage. Current plans call for assembling a station on the beach south of Rehoboth, De. in FM28 in one of the state parks. We plan to run abt 400 watts into a 98.5 foot, 43 element stacked array (15.2 wavelength). We plan to stack 2 yagis on top of each other and set them at abt 32.5 feet above ground level.(see ve7bqh's web page for design details.) This seems to get around the power problem. We plan on running CW on or about 144.200MHz +/-. EIRP is calculated to be in the neighborhood of 56KW. Receiving may be another problem. We are addressing that at this time, but have not firmed any details of preamps yet. We are seeking amateurs in the coastal regions (or hams who can set up in the coastal regions) of England, France, Spain and/or Portugal to assist in this do-able adventure. Any one who is interested in this can write to me at this e-mail address markhollowaysr@yahoo.com or by snail mail (See QRZ for address). To prove the attempt, I have developed a 'double blind' system to make sure there is no question about the two stations having heard each other. We have not posted a web-site yet but we may do that. That has not been decided yet. 73, Mark, KE3UY.

New 2m Transatlantic Attempt

The EI2TAA group arround Harry, DL2DAO, plans another 2m attempt this year in August.

IM96 in November

EA7/DJ4UF/p plans another 2m FSK activity from IM96bw in November this year.

- Miscellaneous

4NEC: für Antennensimulanten

Die URL http://www.qsl.net/wb6tpu/swindex.html bietet (fast) alles, was sich der NEC-User wünscht. Diverse kompilierte Versionen von NEC-2 und eine große Anzahl von Zusatzprogrammen, die die Arbeit mit NEC einfacher machen, kann man sich auf die Festplatte laden.

Ein Besuch bei "The unofficial Numerical Electromagnetic Code (NEC) Archives" lohnt sich!

Dort findet man auch 4NEC: einen Prae- und Postprozessor, der unter Windows laeuft. Das Programm erleichtert wie u.a. EZNEC das Erzeugen der Eingabendaten fuer NEC und die Auswertung der Ausgabedatei.

In freier Übersetzung und Auswahl einige Informationen, die vom Programmautor Arie, 4nec2@gmx.net, unter der o.a. URL zu finden sind.

"4NEC ist eine benutzerfreundliche Umgebung für den NEC-2-Rechenkern. Es bietet all das, was man zur Problemspezifikation, zum Rechnen, zur Auswertung und Optimierung des Antennensystems braucht.

Merkmale von 4NEC sind u.a.:

- graphische Darstellung der Antennengeometrie und der Ergebnisse (Ströme, Nah- und Fernfeld);
- Optimierung mit der Gradientenmathode oder einem genetischen Algorithmus;
- Strukturen bis zu 11.000 Segente koennen berechnet werden;
- bis zu 5 verschiedene Feldstärkedaretellungen in einem Fenste;
- VSWR, Gewinn, F/B, F/R, Z und X können als Funktion der Frequenz dargestellt werden;
- bei Bedarf kann man in der Datei, die die Antennengeometrie enthält, mit Variablen, Konstanten oder Gleichungen arbeiten;
- Überprüfung der Antennengeometrie: sind die Bedingungen von NEC-2 erfüllt?
- Antennen koennen mit definiert eingepraegten Stroemen gespeist werden; (das ist in NEC-2 nicht eingebaut und erfordert einen Trick)
- ein Smith-Diagramm fehlt auch nicht."

Das Programm unterstützt alle Karten des NEC-Decks, den NEC-2-Numbercruncher dafür gibt es für diverse Anforderungen und die graphische Auswertung unterstützt auf Wunsch sogar DirectX. Man muss aber keinen neuen Rechner mit allem Pipapo besitzen, um dieses Programm nutzen zu können.

Besonders die Möglichkeit mit Formeln und Variablen zu arbeiten, ist für jeden Antennensimulanten eine wertvolle Möglichkeit. Fazit: einfach mal ausprobieren! (DJ2ZS)

(A lot of helpful information and software for all who are interested in antenna simulations with NEC can be found at: http://www.qsl.net/wb6tpu/swindex.html. There you will find the complete English text, too)

New 6m Contest

The first Marconi Memorial Contest (CW only) on 6m will take place on November 18th – 19th 2003 (14-14UT). Contest Manager is IW3RI. Email: iw3ri@libero.it

Most wanted DXCCs on 2m

As announced in DUBUS 4/02 p.96 PA2CHR has made a survey for the most wanted 2m DXCCs. Chris has sent us a preliminary ranking (65 participitiants) on February 21st:

1. ZA 2. 3A 3. 7X 4. OD 5. 1A 6. 5A 7. SY 8. HV 9. C3 10. ZB2

Final results will be published in mid March. (tnx Chris!)

Most wanted Squares on 2m

As announced in DUBUS 4/02 p.96 DL8EBW has made the survey for the most wanted 2m squares for 2003. Guy has sent us a preliminary ranking (69 participitiants) on February 22nd: **1. KO57 2. KM28 3. KO67 4. KO63 5. KO43 6. KO31 7. KO47 8. KO40 9. JM57 10. KO42.** Final results follow in the end of March. Tnx Guy!

6m in DL

On February 18th the German authorities have published a draft with some new rules regarding the amateur radio law in DL. According to this draft the 6m band will be open to any radio amateur (except the novice licence) in DL in the future. So far there are only 3000 special 6m licences in DL. Anyway there will remain the protected ares around the 3 TV-transmitters in southern DL.

Moon acitvities

On November 26, 2002 agreements were executed in Moscow, Russia between the International Space Company, Kosmotras and the private United States company TransOrbital, Inc., for use of a series of Dnepr launch vehicles on the first commercial missions to the Moon.

(Source: SpaceDaily)

Ed.: May be this will be a chance to set up beacons on amateur radio frequencies on the moon?

Email reflector for Aurora and FAI

Hi aurora fans! We would like to invite all those interested in aurora or FAI to join the aurora discussion forum (email reflector). This is a place to discuss anything relating to aurora (radio or visual) and FAI. For more info or to join the forum, please visit: www.freelists.org/webpage/aurora

Those interested in receiving VHF aurora warnings via email or SMS are invited to subscribe to the DXrobot service. For info about DXrobot, please visit: www.gooddx.net/

73, Paul (N1BUG), Allard (PE1NWL), and Volker (DF5AI)

DUBUS Flea Market

Allthough everybody buys and sells everything via internet, this column is open now for any private "For Sale" and "Wanted" ads as long as the content is amateur radio related. This service is free for all subscribers. Please send your ad to: DUBUS@web.de

Urlaubs-QTHs für Funkamateure Hoilyday QTHs for Ham`s

Kennen Sie http://www.funk-urlaub.de oder http://www.ham-vacation.com? Wir suchen weltweit für Funkamateure geeignete Ferienwohnungen und Ferienhäuser. Schauen Sie sich bitte unsere Datenbank an. Wir bereiten ihr Angebot für die Datenbank auf und stellen es ein. Dies ist für Sie kostenlos. Selbstverständlich können wir einen Link auf Ihre eigene Homepage legen. Der Eintrag Ihrer e-Mailadresse erfolgt natürlich auch.
Ham-vacation ist derzeit auf funk-urlaub umgeleitet. Sobald genügend englischsprachige Seiten vorliegen, wird diese Datenbank in englischer Sprache aufgebaut. Die Übersetzung müssen Sie allerdings selbst erstellen. Die Kosten sind sehr gering und betragen nur 35,-- Euro im Jahr. Der erste Eintrag von Ländern, die in der Datenbank noch nicht vertreten sind, werden im ersten Jahr kostenlos eingetragen. Kontakt: info@funk-urlaub.de (DF4KV, Paul)

Do you know http://www.funk-urlaub.de or http://www.ham-vacation.com? We look worldwide for suitable vacation homes and holiday houses for radio amateurs. Please look at our data base. We process your offer for the data base and insert it. This is free for you. Of course we can set up a link to your own homepage. The entry of your E-Mail address is possible, too. Ham-vacation is at present rerouted to funk-urlaub.de. If there are enough entries in English language present, this database will be built in English language, of course. You however must provide the translation. The costs are very small and amounted to only 35,-- euros per year. The first entry of each country, which are not yet represented in the data base, are registered free of charge in the first year. Contact: info@funk-urlaub.de or paul@ham-vacation.com (DF4KV, Paul)

- Beacons

F5XAD on 10 GHz

The beacon F5XAD on 10368,860 MHz, constructed by F2SF, is now qrv and located at 2400m asl in JN12BL (Pyrénées mountains). The beacon has 2w eirp and the takeoff is very good from 340 to 65 degrees (the 432.978 MHz bcn at same location has been heard from G and DL). Might be the highest 3cm bcn in Europe? Thanks for any report at : balises@ref-union.org Updated F beacon list at: http://www.ref-union.org/balises/index.html
73 de Michel F6HTJ

OH2VHF qrv now

The new OH2VHF beacon is on the air from KP20BB isince mid February. Details: 144.443 MHz, Output 25 watts, main beams 20° and 230°, antenna height 30m agl, about 60m asl, antenna type 2 x AV1526.

DB0RG (ex DL0UH) QRV

The new beacon DB0RG is qrv since December 2002. It is working in the QRG 144.440 MHz the former QRG of DL0UH (the famous Kasseler Bake) that went QRT some years ago.
DB0RG is located at a new QTH on the Ravensberg, close to Bad Sachsa in the souther part of the Harz mountains. The locator is JO51GO and it is 730m a.s.l. DB0RG is also running on 432.940 and 1296.940 MHz.
For March 2003 it is planned to get the beacon also running on 2320,912, 3456,912 and 5760,912 MHz. During the late summer in 2003 it is planned to extend also to 10368,912 or 10368,925 MHz, 24192,912 and 47088,912 MHz . 73 de Sigi, DL4OAN, Beacon keeper

Iceland 2m beacon back soon

The 2m beacon TF3VVV (HP84) should be back operational soon on 144.460 MHz.

IQ0RI/B: new beacon in Italy

Since February 2003 there is a new beacon operational from central Italy. Here the details: IQ0RI/B, 144.462 MHz and 432.831 MHz. Loc.: JN62MH, 1010m a.s.l., 3 ele yagis, 330 degr., 2m: 25 w erp, 70cm: 40 w erp. This beacon will be extended to higher frequencies soon. The former beacon IR0RI/B on 144,475 (JN62MI) is QRT!

SR2VHJ beacon in Poland

Since February 2003 the beacon SR2VHF is qrv from JO93AD on 144.476 MHz with 6 watts and a 10 ele yagi direction west. In 2002 this beacon was temporarily qrv as SR2VHB. (tnx SP3VSC)

HB9OK Beacons qrv

Since Sept. 29th 2002 the HB9OK beacon is qrv from JN45MW (1601 m a.s.l.) each with 3.5 watts and omnidirectional antenna on 144.434,5 432.938,5 1296.875,5 5760.590 and 10368.200 MHz.
You are kindly invited to send your reports to: tera@ticino.com if you ever receive one of the above signals which are difficult to be heard towards North due to Alps. Best 73, Andrea HB9DUR, TERA Radio Club

SV5VHB beacon qrv

The beacon SV5VHB is qrv with 1 watt and omnidirectional antenna from KM46 on 144.850 MHz. (tnx SV5BYR)

No beacon coordinator in DL

At the end of the year 2002 the German beacon coordinator DJ3TF stopped his work. According to the German VHF manager DF7VX there is nobody available at the moment who could do this work. This is quite a bad situation as there is for sure some work to to regarding the 432 MHz and 24 GHz beacons.

New beacon QRGs on 24 GHz

At the IARU Region 1 meeting in San Marino in September 2002 it was decided to change also the QRGs of the 24 GHz beacons.

Myths and facts about 2m Transatlantic Propagation: VE1SMU/H QRT since 1999!

During the last years there were some interesting reports from Europe about the (possible) reception of the 2m high power transatlantic beacon VE1SMU/H in Nova Scotia (FN84). The last of these reports was submitted by DH3YAV to the DX-cluster and later to DF5AI via email, who claimed to have heard this beacon on 144.300 MHz during summer 2002. Allthogh there were already some other doubtful details in this claim, DUBUS has made some investigations via email. With the kind help of VE1MR, VE1YX, WZ1D, K1WHS and others it was possible to get into contact with the VE1SMU beacon keeper, Mr. William Lonc, VE1WPL. William writes in Febrary 2003:

"Joe, Thanks for the inquiry.

1. I am still trying to determine what 2-m beacons were on and where. My recollection is that the 100W VE1SMU/H, located in Halifax (FN84), was taken out of service about 4 years ago, but I need to search through my files -- which became scrambled in the ourse of moving to a new office -- to pinpoint dates. The antenna was a dual 9 or 10-el yagi pointing more or less a few degrees north of East. In any event, that rig was shipped to the ARC at Memorial University in the summer of 2000 for the Transatlantic project.
2. I recall that around 5 years ago somebody in England claimed successful copy but there was much sketicism.
3. I received a QSL from DG0DR dated 22.07.01 claiming copy of VE1SMU/S on 432.300, RST 54. However, all the antennas point West and nominal TX power is 10W and nom. ant. gain (was) just over 10 dbd.
4. There has been a 2-m beacon (VE1SMU/G) at FN74 on 144.295 (approx.) from Oct. 2000 to the end of 2002, 24-hr/day. It will be back on May 1 until Oct.1, but probably for only 2 or 3 hrs/day in the evening, due to power costs. The antenna points West, about 8 dbd, TX about 15W.
5. The status of the beacons on Sable Island is unkown at this trime. (Ed: VE1SMU/S)
6. The current VE1SMU/H (within FN84) beacons are: 50.001 (20W--6 dbd); 222.050 (6W--6dbd); and 432..301(10W--6dbd); all pointing West. 24 hr/day.

Cheers William"

With this information it is clear that NO reception reports of VE1SMU/H (FN84) on 144.300 have been possible during the last 3 years because this beacon was QRT! The beacon VE1SMU/G from FN74 is qrv on 144.295 but only running qrp and antenna to the west! (DL8HCZ)

W1RJA/B also QRT

The above mentioned investigations about the 2m transatlantic beacons in N.A. resulted in the bad news that also the 2m beacon W1RJA/B on 144.282 MHz (FN42) went QRT for ever already in 2001! This means that there is NO 2m transatlantic beacon qrv from W/VE towards Europe anymore. Anyway there is still the French QRO beacon transmitting to the West for this purpose. Anyway we suppose that not many N.A. hams monitor 144.405 MHz. DUBUS would suggest to change this beacon to a QRG close to 144.200, the N.A. calling QRG. Any comments?

New Transatlantic Beacon Project: Help needed!!!

Several years of operating 2m QRO beacons from W1 and VE1 towards Europe has not given any positive results and the beacons are QRT (see above). DUBUS suggests to set up new beacons at more promising locations. The first project could be a beacon located in Bermuda, VP9 (Loc. FM70) running around 20w rf into a yagi antenna beaming east. This should be sufficient to detect Tropo / Es openings from VP9 to EI/G/CT/EA1/F. For this project any help is very welcome! Contribution are needed to realize this project. (TX, keyer, PA, antenna, money (of course). Please contact DUBUS. (email: DUBUS@web.de). DUBUS will sponsor the monthy power bill of USD 10.00

Other interesting possible beacon locations could be in northeastern Brazil, FY, KP4 and 8P.

DUBUS will try to organize several beacons (2m and 6m) for propagation studies in the future. Obviously there is no other worldwide coordination regarding this matter. We have the same situation with beacons for 2m TEP. It should be a MUST to have good beacons running on 6m, 4m and 2m during the peak of the next cycle from PY, ZD7, ZD8, V5 and ZS6. So there is a lot of work to do. If there is anybody interested in founding something like a worldwide VHF beacon group, please let me know. Joe, DL8HCZ

New QRGs for the 70cm IARU Region 1 beacons

At the IARU Region 1 conference in San Marino in November 2002 it was decided to change the beacon QRGs in the 70cm band. Here we print a draft for the new QRGs that is coming from the IARU Region 1 beacon manager G0RDI. This is not the final version. So there is a chance to ask for changes! Please send your comments!

Call	QRG old	QRG new (proposed)
OE3XMB	432.800	432.400
OY6UHF	432.885	432.402
EI2WRB	432.870	432.403
F1ZNI	432.804	432.404 planned
PI7QHN	432.905	432.405
SK4UHF	432.905	432.405
OK0EO	432.966	432.406 proposed
PI7YSS	432.895	432.407
OZ4UHF	432.895	432.407
F5ZPH	-	432.408 proposed
DB0ZW	432.810	432.410
DB0JG	432.925	432.412
SK6UHF	432.925	432.412
F5XAG	432.863	432.413

DB0JW	432.975	432.414	
DB0UBI	432.920	432.415	
PI7CIS	432.816	432.416	
DB0LB	432.945	432.417	
DB0OS	432.945	432.417	
HG3BUA	432.945	432.417	
OH9UHF	432.945	432.417	
F????	-	432.418	proposed
F5XAS	432.978	432.419	
DB0VC	432.990	432.420	
PI7HVN	432.873	432.423	
LY2WN	432.900	432.425	
DB0YI	432.900	432.425	
EA6UHF	432.918	432.426	
HG7BUA	432.930	432.428	
GB3MLE	432.910	432.430	
9A0BUH	432.847	432.431	
HB9F	432.984	432.432	
DB0LBV	432.845	432.434	
LA9UHF	432.845	432.434	
ES0UHF	432.835	432.435	
F5XAZ	432.886	432.436	
OK0EP	432.886	432.436	
LA1UHF	432.860	432.437	
HG6BUA	432.947	432.438	
DL0UH 1*)	432.940	432.440	
SK7MHH	432.940	432.440	
LA7UHF	432.830	432.441	
F5XBA	432.830	432.441	
CT????	432.842	432.442	proposed
OH2UHF	432.852	432.443	
DB0KI	432.840	432.444	
OH6UHF	432.840	432.444	
GB3LER	432.965	432.445	
OK0EB	432.970	432.446	
SK7MHL	432.970	432.446	
SK1UHF	432.950	432.447	
S55ZRS	432.950	432.447	
DB0IH	432.950	432.447	
S55ZCE	432.980	432.448	
OZ1UHF	432.955	432.449	
DL0UB	432.850	432.450	
I5B	432.850	432.450	
OK0EC	432.980	432.452	
GB3ANG	432.980	432.453	
SK3UHF	432.855	432.455	
LA5UHF	432.855	432.455	
DB0GD	432.800	432.456	
SK2UHF	432.875	432.457	
LA8UHF	432.820	432.460	
LA2UHF	432.870	432.463	
DF0ANN	432.965	432.465	
ON4UHF	432.994	432.467	
LA6UHF	432.865	432.468	
GB3MCB	432.970	432.469	
OK0EZ	432.870	432.470	proposed
OZ7IGY	432.930	432.471	
OE3XAA	432.882	432.473	
DB0SGA	432.975	432.475	
HG1BUA	432.975	432.475	
DB0ABG	432.825	432.477	
LA3UHF	432.880	432.478	
OM0MUA	432.888	432.478	
SR5UHF	432.982	432.479	
GB3SUT	432.890	432.480	
LA4UHF	432.890	432.480	
GB3NGI	432.942	432.482	
OZ2ALS	432.983	432.483	
DL0IGI 1*)	432.995	-	
GB3BSL	432.934	432.487	
DB0AD	432.918	432.488	
EA8UHF	432.918	432.488	(not qrv)
OK0EA	432.935	432.489	
DB0FAI 2*)	432.875	-	
OH7UHF	432.875	432.490	

So far the list from the IARU.
Here some additional comments from DUBUS:
1*) (Not qrv, nothing planned for 70cm, 10m beacon only!)
2*) planned, not qrv
There are around 10 more beacons qrv in Europe on 70cm that are not listed here. (e.g. UT3BW, CT0RIB, IV3B, IQ0RI).

4m-Band: Bits and Pieces

-Sources in SP say that there is a good chance for an amateur radio allocation on the 4m band in Poland in 2004.
-According to officials from the SARL (ZS club) there is no beacon qrv from South Africa on 70 MHz anymore. ZS1FOR has been qrv only for a short time some years ago and ZS5MTL has never been qrv. Anyway the 4m band is open for radio amateurs in ZS, but the interest seems to be very low.
-On February 9th 2003 there took place a nice MS QSO between GD4GNH and S51DI on 4m.
-A new 4m beacon is planned to become qrv soon:
GB3WSX, IO80QW, 70.006 MHz, 20 watts, 7 ele yagi.
-In Slovenia there are around 15 stations active on 4m now:
JN65: S53VV, S53X, S57A, S57ORO, S57UUD, S59F.
JN66: S57LNX
JN75: S53J
JN76: S51DI, S51IV, S51UF, S52AU, S52SK, S53DGM (Club call), S56WDN, S59MA.
JN86: S54M.

Redaktionsschluss für Aktivitätsberichte und Beiträge für DUBUS 2/2003 ist der 20. Mai 2003.
Deadline for reports etc. for DUBUS 2/2003 is May 20th 2003.

Please send your info for DUBUS to:
DUBUS@web.de

DUBUS Poll - Leserumfrage

Wir haben an dieser Stelle im Heft 3/2002 alle Leser des DUBUS Magazins nach ihrer Meinung zum Inhalt und Umfang des Heftes befragt.
Das komplette Ergebnis liegt nun vor. Wir möchten uns ganz herzlich bei allen Teilnehmern bedanken und verprechen, dass wir uns bemühen werden, möglichst viele Verbesserungsvorschläge umzusetzen. Immerhin haben weit über 100 Leser teilgenommen. Das Ergebnis ist natürlich nicht repräsentativ, aber trotzdem interessant.
Die 10 Gewinner der Freiabos für 2003 wurden Ende Dezember benachrichtigt.

In issue 3/2002 we published the questions for a poll regarding DUBUS`s content and size.
Many thanks to all who took part! We got more than 100 participitiants. Here you find the results. The are not representative, of course. Anyway the results are interesting. The winners of the 10 free subs for 2003 got info in the end of December.

73`s
Joachim Kraft, DL8HCZ / CT1HZE

Ergebnisse Results

FRAGEN / QUESTIONS
Antworten / Answers

1. Seit wie vielen Jahren (ca.) lesen Sie DUBUS? For how many years have you read DUBUS?

From 1 to 26 years, 15 years on average.
Von 1 bis 26 Jahren, im Schnitt 15 Jahre.

2. Nutzen Sie das Internet?
Do you use the internet?

YES	NO
91%	*9%*

3. Meinen Sie, dass es im Zeitalter des Internets überhaupt noch sinnvoll bzw. nötig ist, eine gedruckte Zeitschrift wie die DUBUS herauszugeben?
Do you think that it still makes sense to publish a printed magazine like DUBUS in the modern times of the internet?

YES	NO
91%	*9%*

4.) Meinen Sie, dass ein vierteljährliches Erscheinen der DUBUS ausreicht?
Do you think that quarterly publication of DUBUS is sufficient?

YES	NO
64%	*15%*

5. Falls Frage 4 mit NEIN beantwortet wurde, wie oft sollte DUBUS dann erscheinen: Alle 2 Monate (A) oder jeden (B) Monat?
If you have answered NO to question 4, how often would you prefer to receive DUBUS: (A) every month or (B) every 2 months?

A	B
7,5%	*11,5%*

6. Finden Sie, dass der Abonnementspreis der DUBUS zur Zeit zu hoch ist?
Do you think that the present subscription rate for DUBUS is too high?

YES	NO
5%	*95%*

7. Wollen Sie das DUBUS-Abo im Jahr 2003 fortsetzten? Do you plan to renew your DUBUS subscription for 2003?

YES	NO
99%	*1%*

8. Falls Sie Frage 7 mit NEIN beantwortet haben, bitte hier kurz die Gründe dafür nennen.
If you have answered NO to question 7, could you please write down the reason(s):

- not active on VHF anymore
- nicht mehr auf VHF qrv

9. Auf welchen dieser Bänder sind Sie QRV? Bitte Bänder untertreichen oder einkreisen.
On which of these bands are you QRV? Please underline or mark.

6m	2m	70cm	23cm	13cm	9cm	6cm
51%	*96%*	*86%*	*69%*	*42%*	*13%*	*26%*

3cm	1.5cm	higher microwaves	Laser	HF
47%	*18%*	*8%*	*6%*	*40%*

10. Hier geht es um den Umfang der einzelnen Rubriken und Themen in der DUBUS. Bitte hinter jeder Rubrik den Buchstaben setzen.
(A) Zuviel? (B) Zuwenig? (C) o.k. wie bisher?
Here we want you to tell us, if the space now given to each subject is (A) too much, (B) too small or (C) OK. Please mark each line with an A, B or C.

C o.k.	B too less	A much	Most important (Question / Frage 11+12)	unimportant
- Technik (Bauanleitungen / Construction)				
45	**50**	5%	58%	1%
- Technische Tipps / Technical Hints & Kinks				
50	**50**	0%	38%	0%
- Ausbreitung / Propagation				
74	17	9%	23%	3%
- Betriebstechnik / Operating Technique				
79	20	1%	5%	0%
- Neue Produkte / New Products				
68	27	5%	15%	3%
- Microwave Parts				
69	21	10%	13%	8%
- Microwave Europe				
78	8	14%	10%	1%
- Microwave USA				
80	1	15%	0%	8%
- EME-News				
76	5	19%	21%	5%
- Tropo-Berichte / Reports				
68	5	27%	10%	8%
- 6m-News + Berichte / Reports				
53	8	**39%**	7%	20%
- FAI-Berichte / Reports				
74	3	23%	1%	9%
- Baken + Bakenliste / Beacons + Beaconlists				
88	7	5%	10%	0%
- Aurora-Berichte / Reports				
75	3	23%	3%	12%
- Meteor-Scatter-Berichte / Reports				
73	3	24%	5%	15%

C o.k.	B too less	A much	Most important	unimportant
- WSJT / FSK – Berichte / Reports				
67	14	19%	5%	14%
- Sporadic-E-Berichte / Reports				
77	5	18%	1%	4%
- Toplisten / Toplists				
56	0	**44%**	5%	**40%**
- News + Comments				
77	22	1%	6%	0%
- EME-Conteste				
85	3	12%	0%	9%
- andere/other VHF/UHF/SHF-Conteste				
75	15	10%	0%	8%
- Contestkalender / Contest Calendar				
74	14	12%	3%	10%
- Meteoritenschauer-Kalender / MS-Calendar				
86	13	1%	1%	1%
- Lasertechnik + QSOs				
61	18	21%	7%	**24%**
- Software für / for VHF/UHF/SHF-DX				
55	**45**	0%	10%	5%
- Quellen im Internet / Internet sources				
59	**41**	0%	0%	1%
- Fotos von Antennen / Stationen / OPs Pictures of antennas, stations, OPs				
76	14	10%	3%	4%
- Nicht-Schmalband-Technik (z.B. ATV) / Non narrowband techniques (e.g. ATV)				
63	14	23%	5%	**41%**

11. Welche der in Frage 10 aufgeführten Rubriken sind für Sie die DREI wichtigsten / interessantesten?
Which of the subjects in question 10 are the THREE MOST IMPORTANT OR INTERESTING for you?
See above 10. – siehe bei Frage 10

12. Welche der in Frage 10 aufgeführten Rubriken halten Sie für die DREI unwichtigsten / uninteressantesten?
Which of the subjects in question 10 are the THREE MOST UNIMPORTANT /

UNINTERESTING for you?
See above 10. – siehe bei Frage 10

13. Bei welchen der in Frage 10 genannten Rubriken schlagen Sie INHALTLICHE Verbesserungen vor? Wie würden diese Verbesserungen aussehen?
For which of the subjects in question 10 do you suggest improvements? How?

- Microwave Parts: Sources and prices.
- Technique: More measurement technique
- MS, Tropo, Aurora-QSOs: Only real DX should be published.
- VHF Operation technique for beginners
- Presentation from beacons and their QTHs
- Equipment for beginners
- No old EME netnews
- No commercially biased technique
- More antenna technique
- More digital technique
- Toplist only one time per year
- Flea market as a new column
- A good Meteor-Shower calendar
- All articles also in German language
- Surplus equipment for VHF/UHF/SHF
- Modifying commercial rigs for hamradio use
- More Microwave QSO reports
- Optimising VHF stations for DX / EME
- VHF Contest calendar
- Introducing the authors
- Presenting new EME stations
- More about software, e.g. Linux
- No "old" QSO reports
- Less QSO reports in general
- Up to date info about beacons
- Reports that motivate others for more activity
- Maintenance for EME stations

(Ed.: These are comments from single amateurs!)

14. Welche anderen Rubriken (zusätzlich zu denen der Frage10) hätten Sie gerne in der DUBUS?
Do you want to see any OTHER sujects than mentioned in question 10 in DUBUS? Which?
- Radio Astronomy for hams
- repeater lists / directories
- 10m band column
- DSP
- Linux
- Microstrip theory
- Digital Modes
- TVI theory and solutions
- Contest reports
- Microwave info from JA / VK / ZS
- ATV and Digital Technique

(Ed.: These are comments from single amateurs!)

15. Kommerzielle Werbeanzeigen:
Wenn von den 100 Seiten im Heft 3 bis 5 Seiten Werbeanzeigen sind, stört Sie das?
Commercial Ads: From the 100 pages of each issue there are 3 to 5 pages with commercial ads. Does this bother you?

YES	NO
2%	*98%*

16. Haben Sie andere Tipps, Anregungen oder Vorschläge zum Inhalt, Aussehen, Umfang der DUBUS, die Sie gerne verwirklicht sehen würden?
Do you have any other hints or suggestions regarding content, size or layout of DUBUS?
- very few want A4 size
- some want a CD with relating software
- few want DUBUS in PDF on CD or web
- some want the layouts for download in the web
- some want 137 kHz band included
- some want to have qso reports only in the web
- some want DUBUS to encourage VHF operation in eastern EU.

17.) Würden Sie es begrüßen, wenn DUBUS auch andere Bereiche des Amateurfunks abdecken würde (z.B. Digitale Betriebsarten, Kurzwelle, allgemeine Afu-Infos etc.)?
Would you like that DUBUS also covers other parts of amateur-radio, e.g. digital modes, short wave, general amateur radio news and infos?

YES	NO
33%	*67%*

18.) Ihre Daten / Your data?
We got replies from 16 different countries.
Aus 16 versch. Ländern liegen Einsendungen vor.

Age / Alter
Durchschnitt / Average: 37
von 20 bis 80 / from 20 to 80

Consequences / Konsequenzen

We will try to publish more technical reports, technical hints, more about software and internet sources and less toplists and a bit less QSO-reports in the future. We will try to establish some new columns if we can find authors!

In Zukunft werden wir versuchen, (noch) mehr technische Artikel und Tipps, mehr über Software und Internet-Quellen zu veröffentlichen. Dafür gibt's dann weniger Toplisten und QSO-Berichte. Neue Rubriken kann es geben, sofern wir dafür Autoren finden! (DL8HCZ)

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Parts & Products

News, Activity Reports, Contests etc.

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The high-performance transverters TR 144H and TR 432H with its outstanding specifications are the combined result of a circuit design using state-of-the-art components and of Kuhne Electronic's long experience in microwave transverters.

The transverters is specially designed for demanding VHF-UHF Amateur Radio applications like high performance contest stations, but can be modified for professional use in the 400 MHz frequency range. The receiver path is able to cope with very large interference levels from other transmitters, a situation common to contest sites with other high-power transmitters in the neighbourhood. To achieve optimum intermodulation and large-signal performance, the transverters uses only one PHEMT RF amplifier stage with a noise figure of 0.3- resp. 0.4 dB and an output intercept point of 25- resp. 30 dBm. A triple resonator helix bandpass filter provides optimum rejection of out-of-band signals and a high-level ring mixer (LO + 17 dBm, 50 mW) with output diplexer converts the input signal to the IF band at 28...30 MHz. The overall gain in the receiver path was deliberately set to only 15- resp. 10 dB, as even high performance HF transceivers have still large signal problems at 28 MHz. For EME and DX work or for long antenna feed cables we recommend a preamplifier like the MICOMM L432Q Low Noise Amplifier mounted directly at the antenna feed point, using separate receive and transmit cables. Here You need only one additional high-quality coaxial relay, as the transverter provides a separate receiver input (N-Connector) and a sequencing logic for controlling preamplifier, high-power-amplifier and relays. The transmitter path uses a second 17 dBm ring mixer for upconversion from 28 MHz to 144- resp. 432 MHz, and two cascaded triple resonator helix bandpass filters are used to achieve an exceptionally "clean" transmit signal. The transmit amplifier uses state-of-the-art LDMOS transistors in the driver and PA stage and is designed for 40 / 60 W output. To achieve optimum tranmitter intermodulation performance, an integrated ALC loop with overdrive indicator limits the peak output power to 20/25 W. An output low pass filter provides a harmonic suppression of more than 60 dB.

The already built-in sequence control make the use of a high quality output stage and a coax relay with a preamplifier directly on the antenna possible. Connectors are on the back of the transverters

- ► Aluminium case with a big dissipator ►including DC-power and control cable
- ► Spurious and harmonic wave suppression better 60 dB
- ► Side band noise figure of the oscillator better –136 dBc/Hz @ 10 kHz at 144 MHz resp. -132 dBc/Hz @ 10 kHz at 432 MHz
- ► Transmitter path: Output power 25- resp. 20 Watt into 50 Ohms, internally levelled via ALC
- ► Harmonic and Spurious Attenuation > 60dB,
- ► Output mismatch: no degradation at P < 20W
- ► PA is convection cooled with large heatsink at rear side (no fans, no noise)
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Technical Specifications

Typ	TR 144 H	TR 432 H
VHF	144...146 MHz	432...434 MHz
IF Frequency range	28...30 MHz	28...30 MHz
IF Input power	1...50 mW	1...50 mW
PTT control	contact closure to Ground	
Output	25 Watt @ 50 Ohm	20 Watt @ 50 Ohm
Current consumption	typ. 4,5 A	typ. 4,5 A
RX Gain	typ. 15 dB	typ. 10 dB
Noise figure	typ. 0,8 dB NF	typ. 1,0 dB NF
Dimensions mm	270 x 260 x 80	
IF connect	BNC- female	
RF connectors	N-female	
DC supply and control connector	SUB-D 9 polig	
Price	995,- EUR	995,- EUR

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