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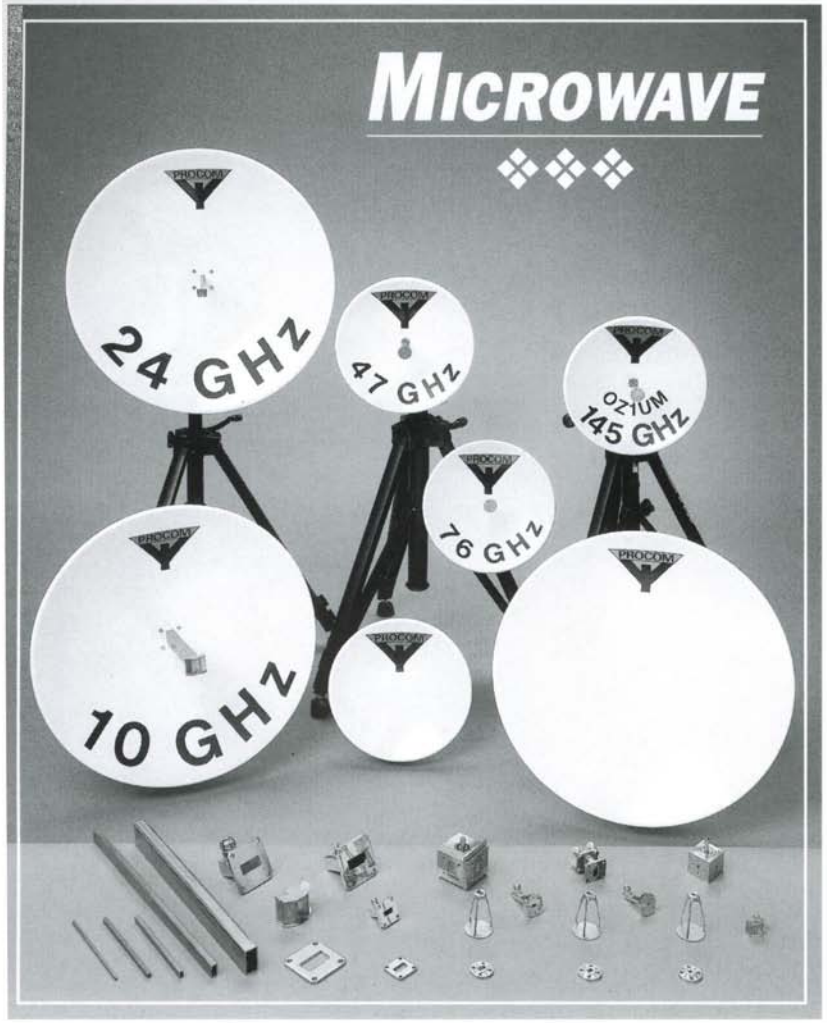
OZ9AAR`s 8m Dish

Entirely Devoted to VHF/UHF and Microwaves



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Editorial

Liebe DUBUS-Leser!

Ich freue mich bekannt geben zu können, dass Luis Cupido, CT1DMK und Leif Asbrik, SM5BSZ, das DUBUS-Magazin in Zukunft mit technischen Beiträgen versorgen wollen. Beide heiße ich herzlich im DUBUS Autorenteam willkommen.

Bedanken möchte ich mich auch bei Henning Weddig, DK5LV, der sehr interessante Informationen für die Rubrik „Microwave Parts" zur Verfügung stellt und bei Jonathan Naylor, HB9DRD / G4KLX, der zukünftig die Rubrik „Regenscatter" betreuen wird.

Ich bin nach dem Ausscheiden von DJ9BV doch recht positiv überrascht über das Engagement und die Hilfsangebote vieler Autoren und Leser.

Die Besonderheit an dieser Ausgabe ist sicher, die große Leserumfrage am Ende dieses Heftes.
Es ist für alle Leser eine Chance, den zukünftigen Inhalt der DUBUS entscheidend mitzugestalten.
Ich hoffe deshalb auf eine rege Beteiligung!

Falls Sie der DUBUS einen technischen Artikel zur Verfügung stellen möchten, wenden Sie sich bitte direkt an den DUBUS-Verlag oder einen der Autoren des DUBUS Teams.

Ich möchte auch noch einmal darum bitten, doch wieder mehr Berichte über interessante QSOs und DX-Öffnungen einzusenden.

Für die Rubriken FAI, Microwave Japan und Microwave Australia suchen wir noch Redakteure.
Für Vorschläge zur Einführung anderer Rubriken ist die DUBUS jederzeit offen. (Siehe auch die Umfrage!)

Redaktionsschluss für die nächste Ausgabe ist der 20. Dezember 2002. Das Heft 4/2002 wird dann Anfang Januar erscheinen.

vy 73, Joachim (Joe), DL8HCZ / CT1HZE
email: info@DUBUS.de

Dear DUBUS Reader!

I am happy to announce that Luis Cupido, CT1DMK, and Leif Asbrink, SM5BSZ, have agreed to provide technical articles for DUBUS in the future. Both are very welcome in the DUBUS team of technical authors.

I also want to thank Henning Weddig, DK5LV, for providing interesting material for the "Microwave Parts" column and Jonathan Naylor, HB9DRD / G4KLX, who will report regularly about Rain Scatter QSOs in DUBUS.

I am surprised quite positively about the offered help from authors and readers after DJ9BV has left the DUBUS team.

The special thing of this issue is certainly the poll that you will find at the end of the issue.
This should be a big chance for all readers to get influence on the future content of DUBUS.
I hope for a big participation!

If you want to provide a technical article for DUBUS please contact DUBUS-Verlag or one of the technical authors from the team.

I also want to ask for sending more activity reports about interesting QSOs and openings.

We still look for editors of the following columns:
FAI, Microwave Japan, Microwave Australia.
If you want to establish any other suitable column in DUBUS please let me know (see also the poll).

Deadline for the next issue is December 20th 2002. Issue 4/2002 will be published in the beginning of January.

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70cm
Deep Dish Feed

Luis Cupido, CT1DMK

Vorwort

Die tiefen Spiegel (f/d 0.3) haben bei Betrieb auf 70cm einen schlechten Ruf, da es schwierig ist, sie mit einem effektiven Feed zu betrieben.
Auf höheren Bändern gibt es die Möglichkeit diese Spiegel mit skalaren Feedern (a la VE4MA) effektiv zu betreiben. Auf 70cm werden diese Feeder allerdings zu groß und unhandlich. Auch die bekannten EIA-Dipole leuchten tiefe Spiegel nicht aureichend aus, so dass z.B. ein 6m Spiegel mit 0.3 f/d praktisch unbrauchbar wird.
In diesem kurzen Artikel wird ein 1 lambda Loop-Feeder vorgestellt, der durch einen herabgesetzten Abstand zum Reflektor ein solches Diagramm besitzt, dass Spiegel mit 0.3 f/d betrieben werden können und der Spiegel nur minimal „blockiert" wird.

Ein-Lambda-Loop-Feeder

Die Ein-Lambda-Loop-Antenne ist bekannt für ihre breiten und einander ähnlichen E- und H-Strahlungsdiagramme. Meist wird sie als geschlossene 1-Lambda-Loop in einer Entfernung von 1/8 bis 1/10-Lambda von der Reflektorfläche, die normalerweise einen Durchmesser von > 1 Lambda besitzt, konfiguriert.
Mit diesem typischen Design kann ein 0.4 f/d Spiegel schon gut ausgeleuchtet werden. Ein 0.3 f/d Spiegel benötigt aber einen „breiteren" Feeder.

Dabei ist die Entfernung des Loops zum Reflektor einer der Schlüsselparameter, um das Diagramm breiter zu machen. Je kleiner der Abstand zwischen Loop und Reflektor, desto breiter das Diagramm. Bei größerem Abstand wird das Diagramm schmaler. Dies gilt für Abstände von 1/8 bis 1/20 der Wellenlänge.
Eine Impedanz nahe 50 Ohm findet man allerdings nur bei einem Abstand von 1/10 Lambda.
Ein weiterer interessanter Parameter mit Einfluß auf das Diagramm ist der Durchmesser des Reflektors. Bei einem Durchmesser ab 1 Lambda und kleiner beginnt das Diagramm breiter zu werden.

Da unser Ziel ist, einen Feed für tiefe Spiegel zu bauen, der so einfach wie möglich zu konstruieren ist und möglichst wenig behindert, wurden die beiden Effekte in Kombination so ausgenutzt, dass das Diagramm breit genug wird, um einen 0.3 f/d Spiegel auszuleuchten, und dabei die Impedanz am Speisepunkt nicht zu niedrig wird.
Es wurde ein guter Kompromiss erreicht, bei dem nur eine einfache Impedanzanpassung nötig ist. (Siehe Abb. / Diagramm zur Erklärung)

Die Impedanzanpassung besteht aus einem Induktor vom Feed-Anschluß zur Loop und einem kleinen, justierbaren Draht auf der gegenüberliegenden Seite.
Der Induktor besteht aus 1.5 Windungen eines 3 mm dicken Drahtes über eine Länge von 20 mm und einem Durchmesser von 20 mm.
Die Endkapazität auf der gegenüberliegenden Seite besteht aus einem 50mm langen, 3mm starken Draht, von dem die letzten 15mm zur genauen Optimierung der Impedanz zurechtgebogen werden können.
Um vertikale und horizontale Polarisation zu erreichen, werden entsprechend je zwei Feed-Anschlüsse und Justierdrähte um 90 Grad versetzt angebracht, was natürlich genau an der Spannungsnullstelle geschehen sollte.
In der Praxis muß bei der Umschaltung zwischen Horizontal und Vertikal beachtet werden, dass der jeweilige andere, unbenutzte Anschluß das Diagramm und die Impedanz etwas verändert. Dieses Problem kann man lösen, indem man Lambda/2-lange Koaxkabel vom Umschaltrelais zu den Feedanschlüssen verwendet.
Dadurch wird der gerade unbenutzte Strang zu einem virtuell offenen Kreis.

Wichtig bei der Anfertigung der Lambda/2-Kabel ist, dass man dabei die Längen in der Antenne und im Koaxrelais mit berücksichtigt. D.h. man muss vom Ende des Anschlusses in der Antenne bis zum Ende des Kontakts im Relais rechnen.

(Dank an Peter, Ex EA6ADW, der meine Aufmerksamkeit auf diese Feed-Methode lenkte und an Jan, DL9KR, der mir mit vielen QSOs beim Testen half.)

Introduction

Deep dishes are gaining a bad reputation on 70cm for being difficult to feed efficiently. On higher bands the scalar feeds (à la VE4MA) are effective, but at 70cm their size makes them too obstructive of the dish aperture, and very inconvenient to mount at the focal point. Also the well known EIA dipoles will under-illuminate deep dishes, for example rendering a 6m dish with 0.3 f/d nearly useless. In this short article I present a 1-wavelength H/V loop feed with reduced distance to the backplane, that produces a polar diagram wide enough for a 0.3 f/d dish with a minimum of antenna blockage.

1-wavelength loop feed

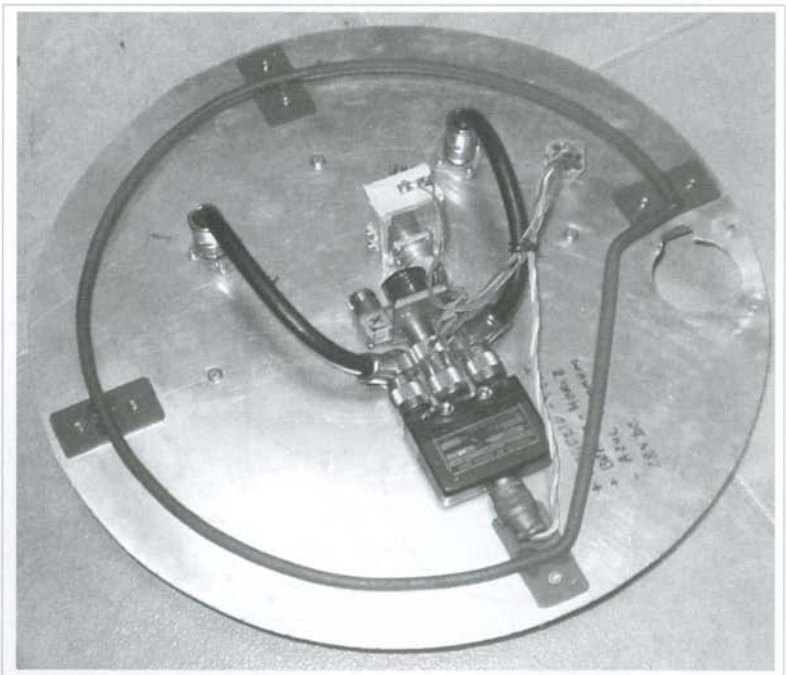
The 1-wavelength loop antenna is well known for its broad and quite similar E and H patterns. Its most common configuration has a 1wl closed loop at about 0.1 to 0.125wl distance from a reflecting plane, which is usually bigger than 1wl in diameter. With this typical design a 0.4 f/d dish could be well illuminated but a 0.3 f/d dish would require a broader pattern.

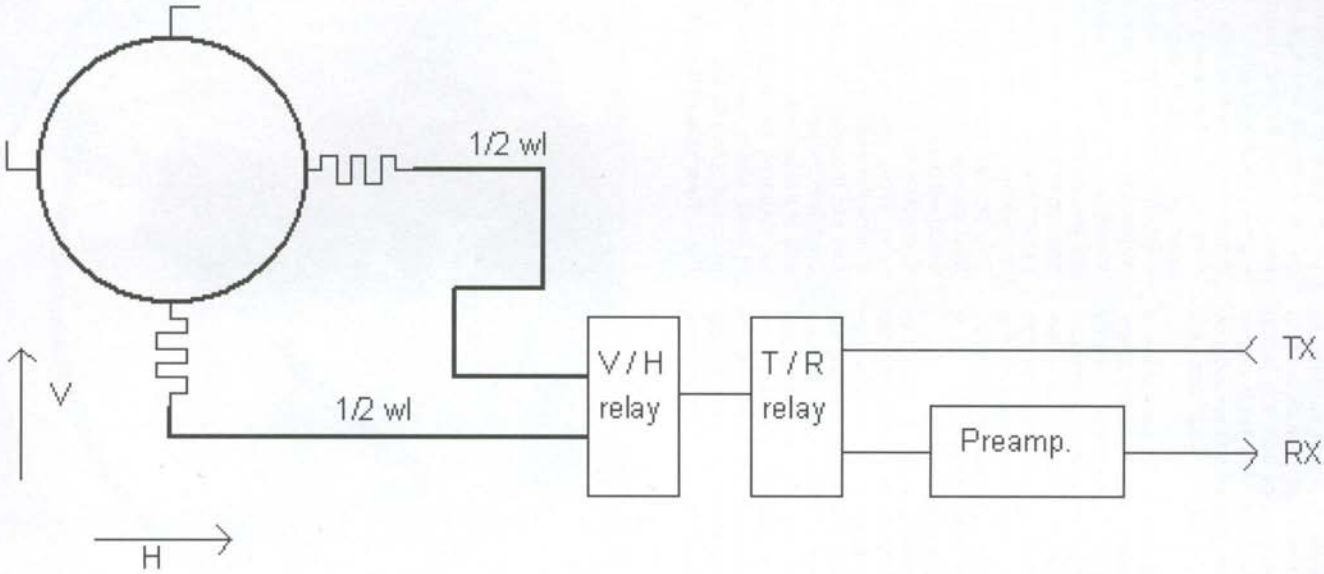
The distance from the loop to the back-plane is one of the key parameters to optimize the beamwidth. Within the 0.05 to 0.125wl range, a smaller distance will widen the pattern while a greater distance will narrow the pattern. However, an impedance close to 50Ω is only found at about 0.1wl from the back plane. Another interesting parameter that also modifies the pattern is the size of the reflector: if we make it quite small, diameters of 1wl or less will begin to produce wider patterns.

With the intention of making a deep dish feed as simple and as less obstructive as possible, the two effects were combined together to widen the pattern enough for a 0.3 f/d dish without lowering too much the impedance at the feed point. A good compromise was found (see diagram and picture) requiring only minor impedance matching. The impedance matching consists of a series inductor from the feed connector to the loop, and a small adjustable capacitance at the opposite position, 180 degrees away from where the inductor is connected. The inductor is 1.5 turns of 3mm wire with 20mm diameter and 20mm length. The capacitor on the opposite side is a 50mm length of 3mm wire, in which the last 15mm are bent for optimizing the impedance match.

Simultaneous vertical and horizontal polarization were obtained by making a second set of feedpoint connections 90 degrees away from the first feedpoint. As seen from each feedpoint, the other connection is at a voltage null which minimizes the interaction. However, the switching between vertical and horizontal needs to be done with some care, as in practice the presence of the other connection will distort the pattern a bit, and will also change the input impedance of the other polarity. This problem can be solved by using 0.5wl lines from the coaxial switch to the antenna feed point, which will place a virtual open circuit at the coaxial connection for the arm that is not selected by the relay. When making these cables, don't forget to include the length inside the antenna, the connectors and the relay: the total length must be measured from the end of the antenna connector to the end of the contact inside the relay. Thanks to Peter, EA6ADW for bringing my attention to this kind of feed, and to Jan, DL9KR for reporting in dBs over a lot of test QSOs.

Fig 1: Rear side of the reflector

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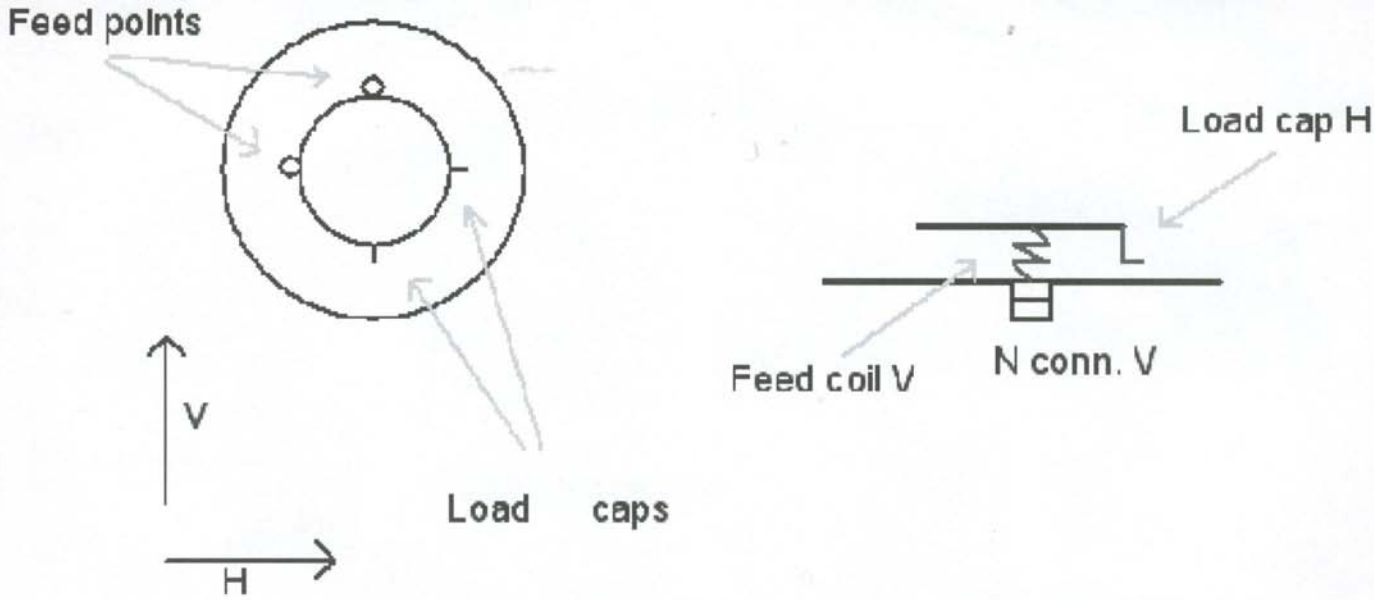


reflector 1wl diameter

loop 1wl perimeter

loop high 0.08wl above reflector

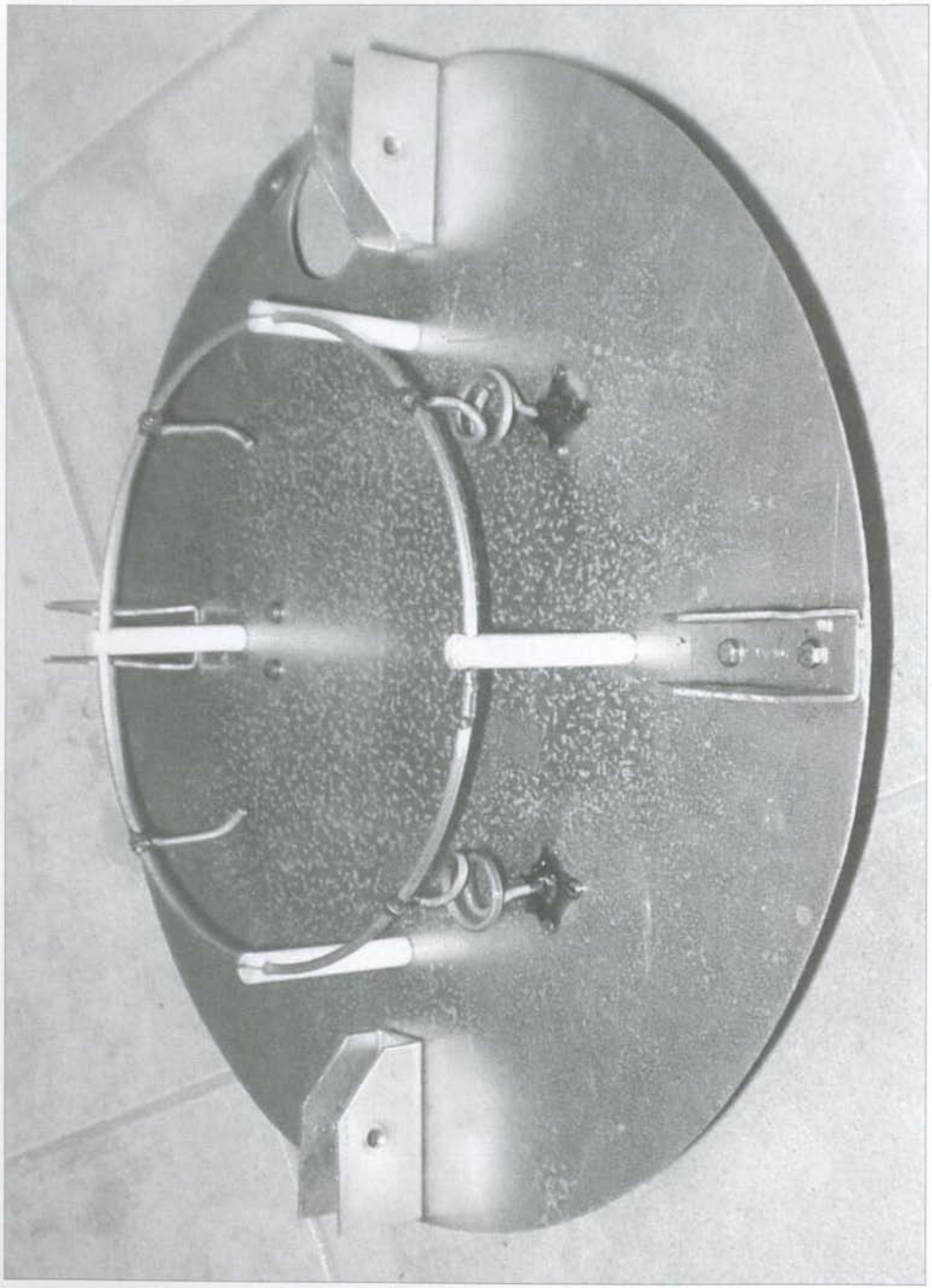


Figure: CT1DMK`s deep dish feed

Locking VCXOs to 10 MHz for Microwave and mmWave Local Oscillators

Luis Cupido, CT1DMK

Most microwave and millimetre-wave converters use a quartz controlled oscillator in the 70 to 130MHz frequency range as the basis for their local oscillator generation. The need for frequency stability is often met by temperature compensated and/or temperature controlled oscillators. However, the necessary relative accuracy can only be obtained by calibrating against a reference standard, or even better, by maintaining it locked to an external reference. 10MHz GPS-disciplined sources are becoming quite popular and a few good designs are already published. The following article presents a universal locking circuit for any VCXO source up to 130MHz, with the special feature of being done with the latest programmable logic technology that enables it to be tailored to specific requirements without changing the PCB board.

Introduction

Locking a VCXO that operates in the 70 to 130MHz range, to a 10MHz reference, doesn't have any a priori difficulty, and the use of today's integrated circuits would make this job quite easy. The obvious scheme would employ a PLL circuit with programmable dividers a suitable phase comparator and loop filter. This could be achieved using different technologies: it could be done using discrete logic either with CMOS or TTL circuits; or using integrated PLLs with direct BCD or binary programming; or using a modern PLL chip and a small microcontroller; or, finally, employing programmable digital circuitry, a gate-array configured with all the dividers and phase comparators we need to accomplish the job.

Technologies

The next few paragraphs analyse the technologies and their advantages and disadvantages for our application.

Using Discrete logic we could tailor the circuit to our needs, but if we have to accommodate several LO configurations the circuit may become too complex and maybe too big. Variations on this scheme were used in Europe to lock to DCF77 /1/, and circuits were at least the size of a 10x16cm Eurocard.

Using an old style PLL chip with direct interface would be a reasonable compromise as it could be done essentially in a single chip, or in two chips if we need a prescaler to divide the VCXO frequency. However, some of these PLL chips are not too good when it comes to phase comparator performance as we discuss later on. Using this approach we may have reasonable performance on the lower microwave bands but certainly unacceptable phase noise on the mmW bands /2/.

Using a modern PLL chip plus a micro-controller would result in a quite good solution. We could have all the flexibility we want, driven by the software, and have a very compact design (all components would be available in SMD). We would still be limited by the specific internal architecture of the IC and its phase comparator performance. Although phase comparators in modern ICs are much better than the first generation of PLL chips, some types still exhibit a certain amount of phase backlash. This solution would be simple to implement using a PLL chip from the LMX series (National) or MB series (Fujitsu) along with a PIC processor and some DIP switches. But despite the programmability of both reference and main dividers we still would have a fixed hardware configuration.

Finally, we could use a gate-array (a CPLD to be more precise) configured to have all the dividers and phase comparators we need. This solution is topologically the same as the first one presented, only this time it is not implemented with discrete logic and interconnecting wires. Instead it uses generic logic inside a gate array configured in the same way as if it was done discretely. The digital circuitry implemented contains all dividers and phase comparators required, and the phase comparator must then be done in such a way that it does not present any of the drawbacks we may find in the previous solutions.

Phase comparator problems

One of the known problems of the first generation of PLL chips with 'leading edge' type phase comparators was the resulting backlash of the comparator's output, although it did not represent any serious problem to the typical applications (usually NBFM radios at VHF and UHF frequencies) in which the few Hz wandering would be negligible. However, to control an LO that will be multiplied by factors of 100 to 200 (for use at the microwave

frequencies) or by a factor above 300 (for use at the millimeter wave frequencies), the story is completely different. This is the reason why most of the microwave PLOs don't employ any of the popular PLL chips. Those that did have only served to confirm the present considerations for the worst and the best: the disastrous arrangement of an MB1501 on the PCOM local oscillators /2/, or the CTI PLOs that employ uncommon Qualcomm PLL chips /3/ that work quite well.

However when it comes to the ultimate precision the diode mixer and the XOR phase comparators are still the winners. For this application, I decided to include a phase comparator that operates at 45 degrees (a simple XOR gate) plus a sequential phase comparator that operates at 90 degrees, keeping an output signal average proportional to the phase difference. Nevertheless on a gate-array we may try many other types of phase comparators and control circuits if we are not satisfied.

A little bit about PLDs, CPLDs and FPGAs

It may be useful to briefly introduce these digital technologies, as this article is mainly targeted to readers who are sometimes not aware of great jobs these chips can do for their RF and MW designs. However, it is out of the scope of the present article to go into great detail about these devices.

Some common acronyms:

- PLD – Programmable Logic Device. It usually retains the configuration permanently on fuses, EEPROM or FLASH cells. One of these can replace a few TTL (SSI/MSI) devices.
- CPLD – Complex Programmable Logic Device. It usually retains the configuration permanently on EPROM (obsolete), EEPROM or FLASH cells. One of these can replace many TTL MSI or a few LSI devices.
- FPGA – Field Programmable Gate Array. This is usually bigger than a CPLD but the configuration resides in RAM cells, therefore requiring a configuration download each time it boots up from power off. These can implement a complete system on a single chip.
- JTAG – Joint Test Action Group. A JTAG standard interface allows you to configure the chip in circuit via a simple connection to the PC parallel port using an appropriate adaptor and software.

The first PLDs, that appeared in the 1980s, presented us with the possibility of replacing a few TTL devices with a one-time-programmable chip (e.g. the PAL and GAL devices), allowing the developer to reduce the board size and enabling logic changes without the need to modify the PCB. The fast evolution of digital circuitry shortly provided bigger devices with erase/program capability. In the 1990s, devices with several thousand gates that could replace large boards of TTL MSI became available, both in program-once and in many erasable flavors. Today (2002) devices with over one million gates are being routinely used by the telecommunications industry. Applications ranging from building your own microprocessor to a complete system on a chip are within the present-day capabilities of these devices. While very large amounts of logic can be configured in those expensive devices (100 to 300€/$), smaller devices start at low prices (20€/$ for a 5000-gate device). The most well-known manufacturers of these devices are ACTEL www.actel.com, ALTERA www.altera.com, ATMEL www.atmel.com, LATTICE www.latice.com and XILINX www.xilinx.com but there are others competing in the market.

The CPLDs are quite attractive to be used in the digital circuitry for RF and MW applications involving digital frequency control, as they retain the configuration after power off and have a size capable of hosting several counters and phase comparators etc. Most manufacturers provide CPLDs of the 5000-gates class with EEPROM or FLASH memory programmed via a JTAG interface.

The present PLL design

The circuit is built around an ALTERA device EPM3064ATC44-4 which is a device that can be configured to a maximum usage of 64 macro-cells, that are, in practice, capable of implementing 64 flip-flops in total. With this we want to implement the programmable dividers, the several N and R configurations and to build a phase comparator with the desired performance. The chip configuration was written in VHDL compiled with MAX+Plus II and programmed via JTAG.

The -4 in the device number denotes 4ns delay so it can operate directly at 130MHz clock frequencies, and we can use it for crystal oscillators without needing any prescaler. It will only require that input signals are shaped to the appropriate logic levels; this task is easily accomplished by a 74F04. Three phase-comparator outputs are made available: a classical XOR, a phase-proportional positive slope and a phase-proportional negative slope. In this design the comparison frequency is always above 50kHz, allowing a simple RC loop filter. However, the R and C component values must be changed according to the VCXO tuning characteristics for

best performance and stability.

The VCXO frequency selection is done with 3 bits, allowing up to 8 different oscillators to be used with the same chip configuration. Of course we can program the chip to whatever 8 values we desire. The actual values during the tests and most relevant for European stations are those with 144MHz intermediate frequency as listed below:

-- conf=000 xtal=96.0000 MHz
for 1296MHz >> 144 MHz
-- conf=001 xtal=90.0000 MHz
for 2304GHz >> 144 MHz
-- conf=010 xtal=90.666(6) MHz
for 2320GHz >> 144 MHz
-- conf=011 xtal=117.0000 MHz
for 5760GHz >> 144 MHZ
-- conf=100 xtal=106.5000 MHz
for 10GHz >> 144 MHz
-- conf=101 xtal=125.2500 MHz
for 24GHz >> 144 MHz
-- conf=110 xtal=122.2500 MHz
for 47GHz >> 144 MHz
-- conf=111 xtal=100.0000 MHz
for secondary 100MHz standard.

(note that configuration 010 implements the exact .6666(6) infinite quotient)

Future plans and 1pps from a GPS receiver

There are a few other interesting standards we may want to lock our VCXOs to - for example VLF transmissions or TV Hsync. Any of those will run on the same principles as the described before, therefore requiring small changes on the VHDL source code that could be made straight away.

Using the GPS 1 pps output is probably the most attractive option for portable operations, but this will require a totally different phase lock hardware. However, thanks to the fact of using programmable logic it is possible to implement this without a single change on the PCB (as long as if fits inside the CPLD we are using, the 3064). Preliminary tests are being done with a phase-lag counting PLL with 14bit DAC output implemented on PWM, and results are quite promising. It may well become the simplest form of portable frequency accuracy. Not to mention that it could serve also to make a 10MHz GPS controlled standard with an incomparable simplicity. This development will be presented as soon as fully tested, hopefully in the next issue.

Thanks for the support received during this project from beta-testers Geert, PA3CSG and Jac, PE1KXH.

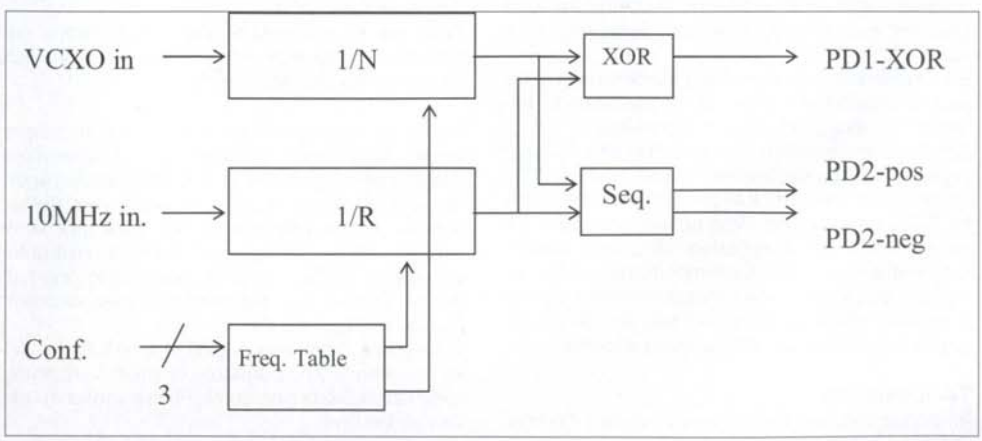
Hardcopies of the PCBs at 4:1 scale, diagrams and ready to program *.pof and *.jam files can be found at my web page:
http://gref.cfn.ist.utl.pt/cupido

Thanks to all that helped with ideas, info and components. If you have any specific configuration needs that are not covered by the present configuration table, please let me know by email at cupido@mail.ua.pt

References

/1/ - Synchronization to DCF77, E. Seibt, DC4RH, VHF/UHF-1994 Muenchen.
/2/ - PCOM oscillators info and modifications http://lance.rfdude.com/11ghz
/3/ - CTI sources at http://www.cti-inc.com
/4/ - Qualcomm at www.qualcomm.com

Fig 1 – Block diagram of the logic implemented inside the EPM3064.



Kopplung von VCXO`s an 10 MHz für Mikro- und und Millimeterwellen-LO´s

von Luis Cupido, CT1DMK

Die meisten Mikrowellen- und Millimeterwellen-Konverter arbeiten mit Quarzoszillatoren, deren Basis LO´s (LO = Local Oscillator) im Bereich von 70 bis 130 MHz arbeiten.
Die benötigte Frequenzstabilität wird hierbei durch temperaturkompensierte und/oder temperaturkontrollierte Oszillatoren erreicht.
Die (relative) Genauigkeit der Frequenz kann aber nur durch Eichung gegen einen Referenzstandard erreicht werden, besser noch durch dauerhafte Kopplung an eine externe Referenz.
10 MHz GPS – Quellen sind inzwischen verbreitet und einige gute Designs hierzu wurden bereits veröffentlicht. Dieser Artikel beschreibt eine universelle Schaltung, die an jeden VXCO bis 130 MHz gekoppelt werden kann. Dabei kann softwaremäßig auf spezielle individuelle Anforderungen eingegangen werden, ohne dass Änderungen auf der Platine nötig wären.

Einleitung

Einen VCXO, der zwischen 70 bis 130 MHz arbeitet, mit einer 10 MHz Referenzquelle zu synchronisieren, stellt kein größeres Problem dar und kann mit modernen IC´s leicht bewerkstelligt werden.
Eine entsprechende Schaltung würde eine PLL mit programmierbaren Teilern, einen passenden Phasenkomparator und Loopfilter beinhalten.
Zur Ausführung bieten sich verschiedene Technologien an: Entweder diskret in CMOS oder TTL-Technologie, oder mit integrierten PLLs mit direkter BCD oder binärer Programmierung, oder mit einem modernen integriertem PLL-Chip zusammen mit einem kleinen Mikrocontroller. Oder als weitere Möglichkeit eine programmierbare digitale Schaltung (Gate-Array) zusammen mit daran angepassten Teilern und Phasenkomparatoren.

Technologien

Im Folgenden warden die verschiedenen Technologien und ihre Vor- und Nachteile in Bezug auf unsere Applikation analysiert.

Bei Verwendung einer diskret aufgebauten Schaltung kann diese genau an die Bedürfnisse angepaßt werden. Möchte man aber diverse LO-Konfigurationen abdecken, würde diese Schaltung sehr komplex und ggf. zu groß werden. Ausführungen einer solchen Schaltung werden in Europa zur Synchronisierung an das DCF77-Signal benutzt (1). Diese Schaltungen benötigen zum Aufbau mindestens eine 10x16cm Eurokarte.

Verwendet man „alte" PLL-Chips mit einem direkten Interface, kann ein guter Kompromiß erreicht werden, da die Schaltung mit einem einzigen Chip (oder mit 2 Chips, falls man noch einen Vorteiler braucht, um die VXCO-Frequenz harabzusetzen) realisiert werden kann. Einige dieser PLL-Chips eigenen sich aber als Phasenkomparator nicht mehr so gut, wie wir später sehen werden. Deshalb sind solche Schaltungen noch brauchbar für die unteren Mikrowellenbänder, auf den höheren Bändern (mm-Bänder) wird das Phasenrauschen aber zu hoch. (2)

Bei Verwendung eines modernen PLL-Chips in Verbindung mit einem Mikrocontroller erhalten wir eine gute Lösung, die viel Flexibilität durch die Steuerungssoftware bietet und dank komplettem Aufbau in SMD-Technik ein sehr kompaktes Desgin ermöglicht. Natürlich gibt es Einschränkungen durch die interne Struktur der ICs und ihre Performance als Phasenkomparator. Obwohl diese modernen Chips besser als die erste Generation sind, stoßen einige Typen immer noch einiges an Phasenrauschen aus.
Der Aufbau einer solchen Schaltung gestaltet sich einfach, wenn man z.B. einen PLL-Chip der LMX-Serie (NATIONAL) oder MB-Serie (FUJITSU) in Verbindung mit einem PIC-Prozessor und DIP-Schaltern verwendet.
Trotz der Programmierbarkeit von Referenz und Hauptteilern, ist man immer noch an eine feste Hardware-Konfiguration gebunden.

Als letztes können wir das oben bereits angesprochene „Gate-Array" (genauer CPLD) verwenden, das alle benötigten Teiler und Phasenkomparatoren enthält. Diese Lösung entspricht vom Aufbau her der ersten Möglichkeit, nur dass hier keine diskreten Bauelemente mit Verbindungsdrähten verwendet werden, sondern eine Logik innerhalb dieses Gate-Arrays entsprechend dem diskreten Aufbau konfiguriert wird.
Die digitale Schaltung enthält alle benötigten Teiler und Phasenkomparatoren in einer Ausführung, dass keine Störungen durch Phasenrauschen etc. vorhanden sind.

Problem des Phasenkomparator

Eines der bekannten Probleme der ersten Generation von PLL-Chips war der resultierende Rückschlag aus dem Ausgang von Phasenkomparatoren des Tys „Leading Edge". Natürlich war dies kein ernstes Problem hinsichtlich der typischen Applikation (nämlich NBFM-Geräten auf VHF und UHF-Frequenzen), bei denen eine Frequenzdrift von einigen Hertz zu vernachlässigen ist.
Will man jedoch einen LO kontrollieren, dessen Signal mit Faktoren von 100 bis 200 (für die Mikrowellenfrequenzen) oder 300 (für die Milimeterwellenfrequenzen) multipliziert wird, ergibt sich eine komplett andere Situation.
Dies ist der Grund dafür, dass die meisten PLO`s nicht mit den bekannten PLL-Chips arbeiten, und diejenigen, die es tun, bestätigen damit nur diese Überlegungen. Ein besonders schlechtes Beispiel mit einem MB1501 am PCOM LO finden wir unter (2). Ein gut arbeitendes Beispiel finden wir unter (3). Hier werden nicht weit verbreitete Qualcom PLL-Chips in CTI PLO`s verwendet.
Wenn es aber letztendlich um die wirkliche Präzision geht, dann sind ein Diodenmischer und ein XOR Phasenkomparator immer die Gewinner.
Für diese Applikation wurde von mir ein 45 Grad Phasenkomparator (ein einfaches XOR Gitter) und ein nachfolgener 90 Grad Phasenkomparator verwendet, die ein durchschnittliches Ausgangssignal proportional zur Phasendifferenz liefern.
Mit dem Gate-Array können wir aber viele andere Typen von Phasenkomparatoren und Kontrollmöglichkeiten realisieren, wenn wir nicht zufrieden sein sollten.

Einiges über PLD´s, CPLD´s und FPGA´s

Es wird sinnvoll sein, einige Worte über diese Bezeichnungen zu verlieren, da sich dieser Artikel an typische HF- und Mikrowellen-Amateure richtet, die eventuell nicht wissen, dass diese Chips auch für HF und Mikrowellenschaltungen große Hilfe bieten können. Natürlich kann hier nicht ins Detail gegeangen werden.
Einige gebräuchliche Abkürzungen:
PLD – Programmable Logic Device: Behält dauerhaft die Konfiguration von Sicherungen, EEPROMs oder FLASHs. Können einige TTL SSI/MSI ersetzen.
CPLD – Complex Programmable Logic Device :
Behält dauerhaft die Konfiguration von EPROMs (obsolet), EEPROMs oder FLASHs. Können viele TTL MSI oder einige LSI ersetzen.
FPGA – Field programmable Gate Array:
Normalerweise größer als ein CPLD, aber die Konfiguration wird im RAM abgelegt. Deshalb ist ein kompletter Download der Konfiguration jedesmal nach dem Einschalten nötig. Hier kann ein komplettes System auf einem Chip implementiert werden.
JTAG - Joint Test Action Group

Die ersten PLD´s, die in den 80er Jahren auftauchten, konnten einige TTL´s in Form eines einmal programmierbaren Chips ersetzen (z.B. die PAL- und GAL-Chips). So konnten die Entwickler die Platinen verkleinern und Änderungen in der Logik vornehmen, ohne dass das PCB geändert werden musste. Die schnelle Entwicklung der Chips führte zu größeren Einheiten, die wiederholt programmiert werden konnten.
In den 90er Jahren kamen dann Chips mit vielen tausend Gittern, die große Boards mit TTL MSI ersetzen konnten. Heute (2002) gibt es Chips mit über 1 Million Gittern, die einen individuell erstellten kompletten Prozessor bilden können. Die größeren kosten 100 bis 300 €, die kleineren gibt es günstiger, so z.B. 20 € für einen 5000 Gate Typ.
Die bekanntesten Hersteller sind ACTEL (actel.com), ALTERA (altera.com), ATMEL (atmel.com), LATTICE (lattice.com) und XILINX (xilinx.com), sowie andere.

Die CPLD´s sind für den digitalen Teil in HF- und Mikrowellenschaltungen sehr interessant. Mit ihnen können z.B. Digitale Frequenzanzeigen realisiert werden, da sie ihre Konfiguration nach dem Ausschalten behalten. Mit einem einzigen CPLD können mehrere Zähler und Phasenkomparatoren gleichzeitig verwirklicht werden. Die meisten Hersteller bieten CPLD´s mit 5000 Gates an, die EEPROM oder FLASH programmiert werden über die parallele PC-Schnittstelle mittels eines JTAG interfaces und spezieller Software dafür.

Das aktuelle Design

Die Schaltung ist mit einem Chip von ALTERA, dem EPM3064ATC44-4 aufgebaut. Dieser Chip kann maximal in 64 Makrozellen unterteilt werden, die in der Praxis insgesamt 64 Flip-Flops implementieren können.
Hiermit wollen wir die programmierbaren Teiler implementieren, die diversen N- und R-Konfigurationen und den Phasenkomparator mit der nötigen Performance.
Die Konfiguration für den Chip wurde in VHDL geschrieben, mit MAX+PlusII compiliert und via JTAG einprogrammiert.
Da dieser Chip (das -4 am Ende der Bezeichnung bedeutet 4 ns Verzögerung) direkt bis 130 MHz eingesetzt werden kann, brauchen wir auch keinen Vorteiler. Es ist lediglich nötig, dass die Eingangssignale auf angemessene Level für die Logik begrenzt werden. Das wird einfach durch einen 74F04 realisiert.
3 Ausgänge des Phasenkomparators stehen zur Verfügung, ein klassiches XOR, ein der Phase

proportional positiver Slope und ein der Phase proportional negativer Slope.
In dieser Schaltung ist die Vergleichsfrequenz immer größer 50 kHz, so dass ein einfaches RC-Loop-Filter ausreicht. Die Werte für die R- und C-Komponente müssen aber angepasst werden je nach Charakter des verwendeten VCXO. So erreicht man bestmögliche Performance und Stabilität.
Die Auswahl der VCXO-Frequenz geschieht mit 3 bits, so dass bis zu 8 verschiedene Oszillatoren erfasst werden können. Natürlich kann der Chip auf 8 völlig beliebige Werte programmiert werden. Die hier angegebenen Werte sind für Europa spezifiziert und gelten für eine ZF von 144 MHz.

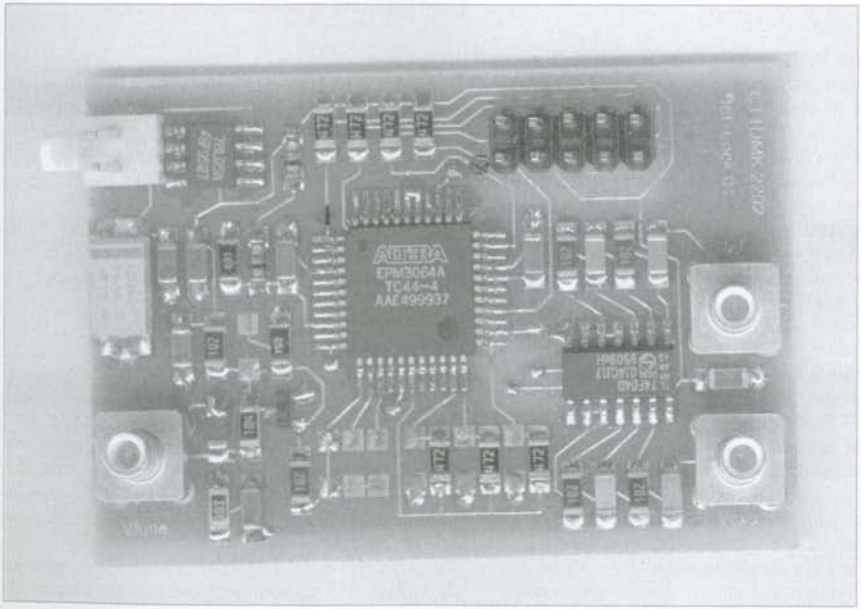
-- conf=000 xtal=96.0000 MHz
für 1296MHz >> 144 MHz
-- conf=001 xtal=90.0000 MHz
für 2304GHz >> 144 MHz
-- conf=010 xtal=90.666(6) MHz
für 2320GHz >> 144 MHz
-- conf=011 xtal=117.0000 MHz
für 5760GHz >> 144 MHZ
-- conf=100 xtal=106.5000 MHz
für 10GHz >> 144 MHz
-- conf=101 xtal=125.2500 MHz
für 24GHz >> 144 MHz
-- conf=110 xtal=122.2500 MHz
für 47GHz >> 144 MHz
-- conf=111 xtal=100.0000 MHz
für einen zweiten 100MHz Standard

Ausblick

Es gibt einige andere interessante Standards, an die unsere VCXOs gekoppelt werden können.
So z.B. Signale von VLF-Sendern oder die Hsync (Synchronisationssignal) von TV-Sendern.
Alle arbeiten nach den gleichen beschriebenen Prinzipien und es sind nur geringe Änderungen im VHDL-Source-Code nötig, um die hier vorgestellte Schaltung zu verwenden.
Die attraktivste Option für portable Zwecke wird der GPS 1 pps Ausgang sein. Hierfür wird jedoch eine komplett andere Hardware für das Einphasen benötigt, was dank der programmierbaren Logik implemetiert werden kann, ohne dass auch nur eine Änderung auf dem PCB gemacht werden muss! (Natürlich nur solange alles in den verwendeten CPLD hineinpasst).
Erste erfolgreiche Tests sind bereits durchgeführt und es sieht vielversprechend aus.
Dies könnte die bequemste Möglichkeit werden, portabel eine hohe Frequenzgenauigkeit zu erreichen. Natürlich kann man so auch elegant einen einfachen GPS-kontrollierten 10 MHz-Standard realisieren.
Sobald die Tests hierzu abgeschlossen sind, werden die Ergebnisse hier veröffentlicht.

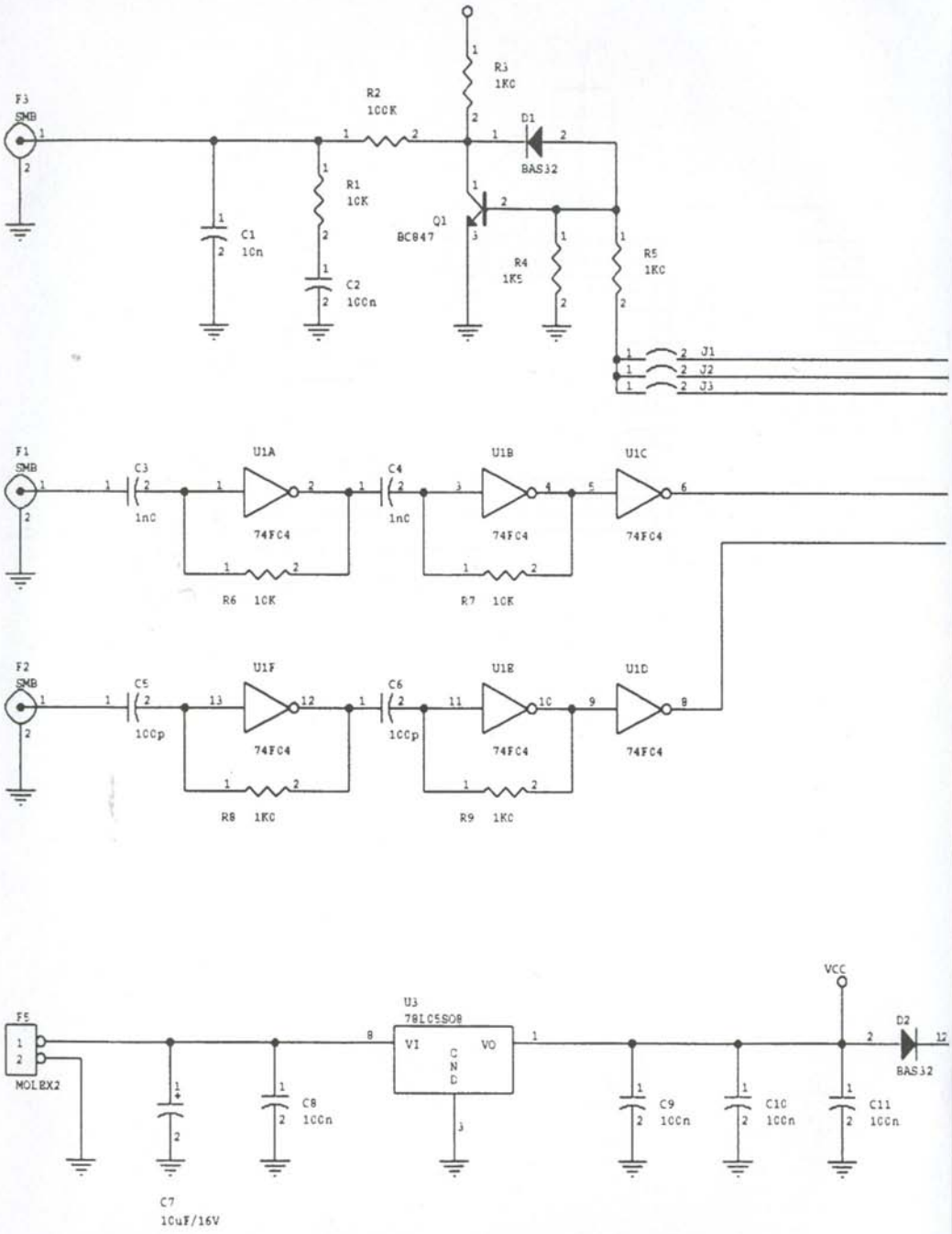
Dank für die Unterstützung geht an die beta-Tester PA3CSG und PE1KXH.

Das Layout (im Maßstab 4:1) für das PCB, weitere Diagramme und fertige .pof und .jam-Files für den CPLD gibt es auf meiner Webseite unter:
http://gref.cfn.ist.utl.pt/cupido

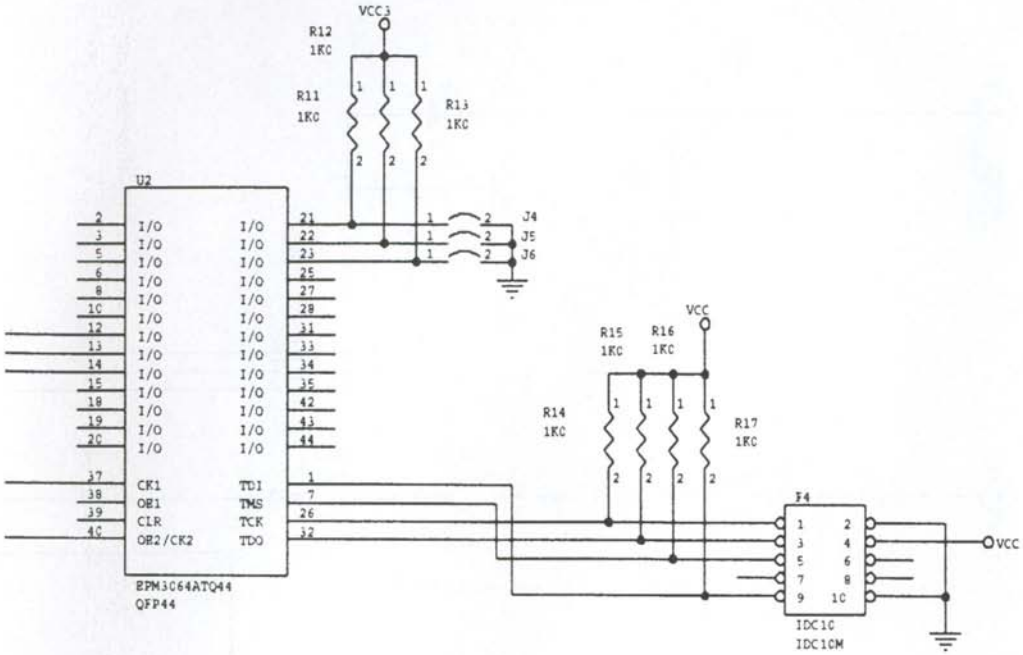


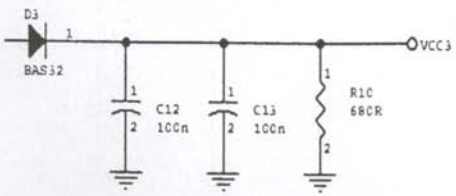
Dank an alle, die mich mit Ideen und Bauteilen unterstützt haben!
Anfragen zu besonderen Konfigurationen etc. nehme ich gerne per email entgegen.
cupido@mail.ua.pt

Fig./Abb: CT1DMK Ref Lock PCB



Reference Lock by CT1DMK **Circuit diagram**





Lock a 50-150 MHz VCXO to a 10 MHz reference

47 GHz-Transverter

Jürgen Dahms, DC0DA
Brandbruchstr.17, D- 44265 Dortmund

Einleitung

Neu an diesem 47 GHz- Transverter ist der eigentliche Transverterkopf. Er besteht aus einem Antennenschalter in Rundhohlleiter-Technik von DJ6BU (DUBUS 2/2001, S. 22), dem Mischer-Modul von DB6NT und einem neuen Power-Modul für den CW-TX. Beide Module haben Rundhohlleiter-Auskopplung und sind ohne Zwischenstücke mit dem Antennenschalter verbunden; diese Montagemöglichkeit wurde bereits in o.g. DUBUS-Artikel beschrieben.

Introduction

This 47 GHz transverter consists of allready known modules. New is the head of this transverter. It consists from a waveguide-switch made in circular waveguide technique (see DJ6BU in DUBUS 2/2001, p. 22). Other componets are the mixer module from DB6NT and a new power module for the CW-TX. Both modules have a circular waveguide output coupling and are connected directly without any intermediate pieces to the antenna waveguide-switch. This was also decribed in the article in DUBUS 2/2001.

CW-TX Modul

The power module consists of an 84mm Aluminium box. In this box we have the 24 GHz-PA PCB (DB6NT) und the doubler PCB from 23.5 to 47 GHz (DB6NT). First the PCB of the PA is glued into the box and being tuned.

For measuring the output a 90 degrees shifted SMA-microstripline socket ist used which is sticked through the bottom of the box. It´s pin has to be connected to the output conductor (LEITERBAHN). The socket has to be removed again after being ready with the tuning. FHX 35 devices are used only on this PCB. With 6 VDC we get at 5 mW input more than 100mW output on 23.5 GHz without reaching the upper limit of power loss. Now the doubler PCB has to be fixed into the box. There should be NO distance to the PA PCB at all. The connection from PCB to PCB could be realised with a soldered single gate or drain leg from an MGF1302 or so. This push (STOSSSTELLE) can be compensated by a tuning flag in front of the doubler diode.

This construction results in a very compact module without needing expensive SMA material for the connections.

The boxes from the mixer and CW-TX have more or less the same size and can be arranged in a compact way in a box together with the waveguide witch.

CW-TX- Modul

Das Power- Modul besteht aus einem 84 mm langen Alu-Gehäuse, in ihm sind die 24 GHz-PA-Platine DB6NT und die Dopplerplatine 23.5 nach 47 GHz (DB6NT) untergebracht. Zuerst wird die PA-Platine bestückt, eingeklebt und abgeglichen. Zum Messen der Ausgangsleistung dient eine um 90° versetzte SMA-Microstripline-Buchse, die durch den 3 mm starken Gehäuseboden gesteckt wird. Dessen Anschlussstift wird mit der Ausgangsleiterbahn der PA-Platine verbunden. Die Buchse muss nach dem Abgleich wieder entfernt werden; sie kann für andere Aufbauten weitere Verwendung finden. Die Platine ist durchgängig mit FHX 35 bestückt. Bei einer Versorgungsspannung von 6 V liefert der Aufbau bei nur 5 mW Eingangsleistung auf 23.5 GHz weit über 100 mW Ausgangsleistung, dies ohne Überschreitung der vom Hersteller angegebenen Verlustleistung. Danach wird die Doppler-Platine eingebaut, wobei kein Zwischenraum zur PA-Platine vorhanden sein soll. Der Übergang von Platine zu Platine wird durch ein aufgelötetes abgekniffenes Gate- oder Drainbeinchen eines z.B. MGF 1302 hergestellt. Diese „Stoßstelle" kann durch das erforderliche Anpassfähnchen vor der Dopplerdiode kompensiert werden.

So erhält man ein platzsparendes CW-TX-Modul ohne teures SMA-Material für die Zwischenverbindung.

Beide Gehäuse, Mixer und CW-TX, haben in etwa die gleiche Länge. Dies ergibt für den Einbau in ein Gehäuse zusammen mit dem Antennenschalter von den Abmessungen her betrachtet einen kompakten Transverterkopf.

LO`s

Benötigt werden jetzt noch zwei Oszillatorbausteine DB6NT, einer für 23.5 GHz mit ca. 5-10 mW Ausgangsleistung und einer für 11.7 GHz mit ca. 30-40 mW Ausgangsleistung. Bei 47 GHz sollten diese jeweils von einem OCXO nach DF9LN angesteuert werden.

LO´s

Now only 2 more oscillator boxes from DB6NT are needed. One for 23.5 GHz with 5 to 10 mW output and one for 11.7 GHz with 30-40 mW output. At 47 GHz they should be driven from DF9LN OCXO´s

Antenna Switch

In order to prevent getting reflected power from the doppler module when switching from mixing to CW-TX (the varactor diode could be destroyed!) it is necessary to use a time sequencer for the voltage of the antenna switch. For example the squencer PCB 1A from DB6NT could be used.

With this kind of antenna switch the output power and NF can reach the dish almost without any losses. If there are losses at the beginning they

can be compensated to zero with short circuit srews (M5).
The accuracy of this swith is similar to commercial products. The input noise figure fluctuates not more than 0.1 dB after switching several times.

Antennenumschaltung

Damit beim Umschalten von MISCHERBETRIEB auf CW-TX die Ausgangsleistung des Doppler-Moduls niemals, auch nicht kurzzeitig, reflektiert wird (Zerstörung der Varactordiode möglich!!!), wird die Steuerspannung für den Antennenschalter über eine Zeitverzögerungsschaltung geführt. Hierzu eignet sich z.B. die 1 A-Sequenzer-Platine DB6NT.
Wie schon bei den Musteraufbauten des Antennenschalters beobachtet, lassen sich Eingangsrauschzahl und Ausgangsleistungen der 47 GHz-Module so gut wie verlustfrei an den Spiegel-Anschlussflansch bringen, anfänglich vorhandene Verluste lassen sich mittels der Kurzschlussschieber (M 5-Schrauben) quasi gegen Null kompensieren.
Die Wiederkehrgenauigkeit des Antennenschalters ist fast mit einem kommerziellen Schalter zu vergleichen, die Eingangsrauschzahl schwankt auch nach mehreren Schaltvorgängen hintereinander weniger als 0.1 dB.

Measuring Results

The following was measured at the antenna input of this 47 GHz transverter.
Input noise figure: F = 7.2 dB (DSB)
Output P1 = 180 uW (SSB)
Output P2 = 25 mW (CW-TX)

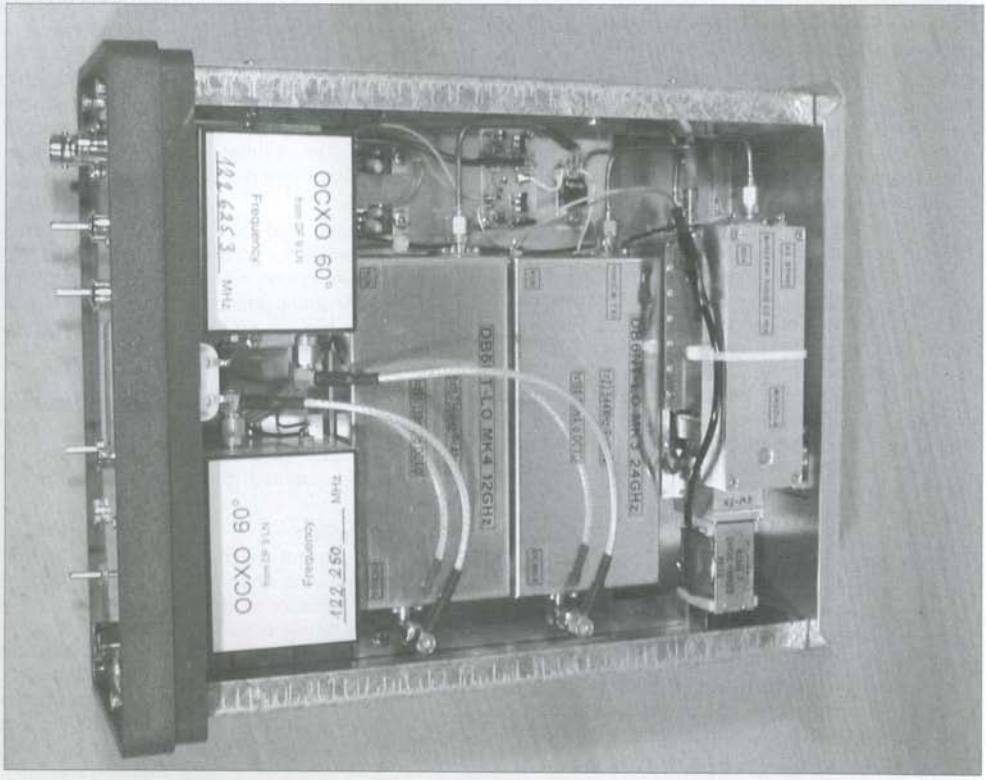
Messwerte

Am Antenneneingang des 47 GHz- Transverters wurden folgende Werte gemessen:
Eingangsrauschzahl F= 7.2 dB (DSB)
Ausgangsleistung P1= 180 µW (SSB)
Ausgangsleistung P2= 25 mW (CW- TX)

Danksagung

Mein besonderer Dank gilt den Mikrowellenamateuren Michael, DB6NT, Karl, DJ6BU und Rudi, OE5VRL, ohne deren Unterstützung der Transverter in der gezeigten Form nicht entstanden wäre. Bedanken möchte ich mich auch bei Hubert DG1KBF für das gefräste Modulgehäuse CW-TX.
Thanks to DB6NT. DJ6BU, OE5VRL and DG1KBF for their help.

Foto: DC0DAs 47 GHz Transverter



DX Radius in Aurora and FAI Progagation

Geographical signature of backscattering aligned to the Earth's magnetic field

Volker Grassmann, DF5AI

Introduction

In Aurora and FAI radio propagation, radio waves are scattered by structures of short duration (minutes to several tens of minutes) located in the E-layer of the ionosphere (105-110 kilometers). Aurora and FAI propagation may be considered the backscattering version of Sporadic-E in which the direction of the scattering is correlated with the direction of the Earth magnetic field line passing through the scatter volume. As a result, the transmitter views the scatter volume and the receiver in directions which generally differ significantly in azimuth. This paper analyses the DX radius of European and Northamerican amateur radio stations in Aurora and FAI radio propagation. Because the inclination of the Earth's magnetic field varies between approximately 51 and 78 degree from south to north Europe, the DX radius may change considerably depending on the geographical position of the radio station. For example, the maximum distance in Aurora/FAI DXing is approximately 2000 kilometers in the south of Europe while the distance is zero in the far north of Europe, i.e. Aurora and FAI radio propagation is not possible there at all.

In this paper, backscattering of radio waves is calculated according to [2], which adopts BOOKER's model of scattering by nonisotropic irregularities [1]. In 1988, the AURORA program was the first amateur radio software to apply this model in Aurora and FAI real time analyses in order to calculate the geographical position of Aurora and FAI with high degree of accuracy [3], [4]. The successor to the AURORA program, i.e. the BeamFinder analysis software [5], is used in this paper to calculate the maximum distances in Aurora and FAI dxing.

The backscatter geometry in Aurora and FAI radio propagation

The vector k tx denotes the wave vector of the incident radio wave (along the line TX - scatter volume) and the vector k rx denotes the wave vector of the scattered radio wave (along the line scatter volume - RX). Aurora and FAI radio propagation corresponds to the so-called bistatic radar case in which the difference between the wave vectors is directed perpendicular to the magnetic field line passing through the scatter volume. The vector orientation may be interpreted geometrically by a cone which originates at the scatter volume and spans around the field line at an angle identical to the angle between the wavevector k tx and the field line B. Note that both the wave vectors, i.e. k tx and k rx, are located on the curved surface area of the cone. On the other hand, the receiver RX is also located on the surface of the Earth, i.e. the receiver is located on the line where the curved surface area intersects the surface of the

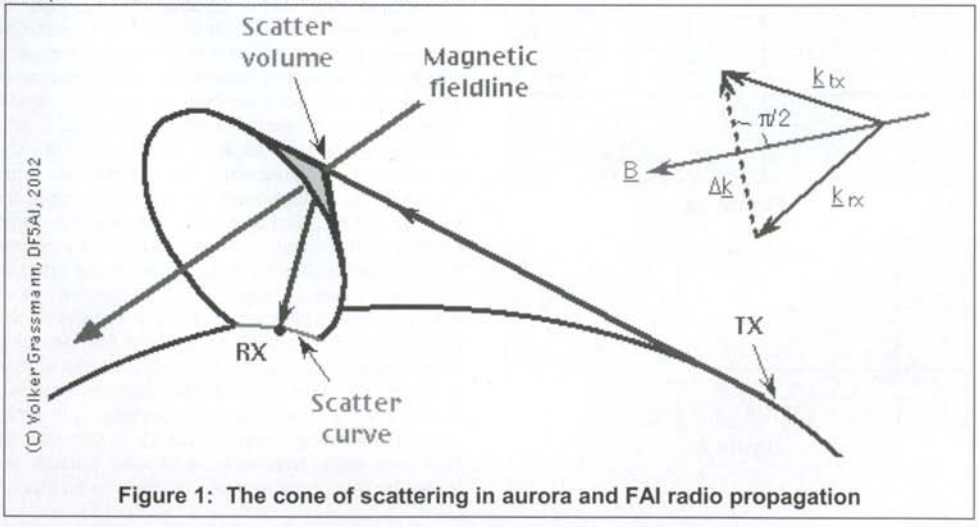


Figure 1: The cone of scattering in aurora and FAI radio propagation

Earth (scatter curve).

The scatter curve

The geometry of backscattering in Aurora and FAI propagation is explained in Figure 1.

Figure 2 shows practical examples in which the transmitter (TX) targets three scatter volumes at identical distances but in different azimuths. The crosses denote the scatter curve, i.e., the intersection of the cone of scattering and the surface of the Earth (note the variable width and length of the scatter curve).

The region of backscattering is generally not spot-like in nature, as in the examples shown in figure 2, but is, more or less, an extended geographical area. Therefore, the geographical pattern is much more complicated in practice and, of course, may vary due to dynamical processes in the ionosphere. Note that the characteristics of a DX opening are also affected by the actual antenna direction and by the antenna's radiation pattern, both of which control the illumination of the scatter region.

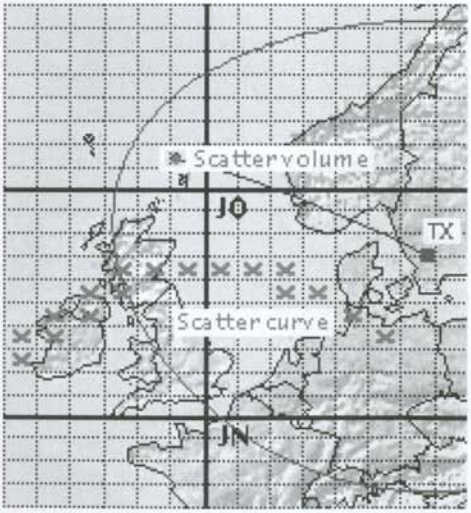


Figure 2a

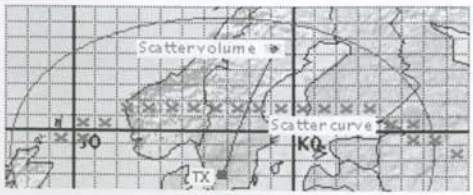


Figure 2b

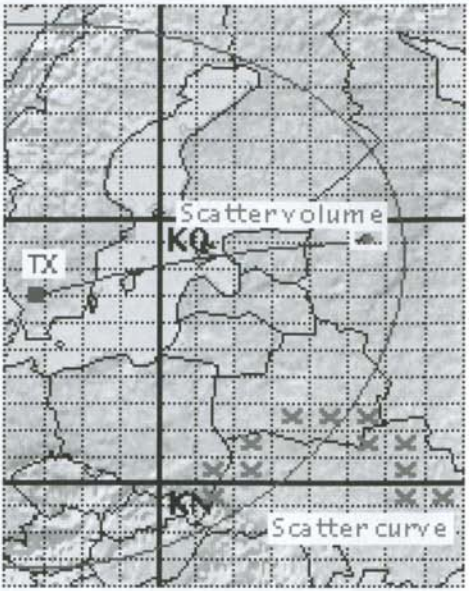


Figure 2c

Figure 2: Examples of the scatter geometry in Aurora and FAI radio propagation. The geomagnetic inclination is 63 degree (Fig 2a), 76 degree (Fig 2b) and 73 degree (Fig 2c) and the geomagnetic declination is -6 degree (Fig 2a), +4 degree (Fig 2b) and +8 degree (Fig 2c). Not the variable width and shape of the scatter curves.

Available scatter volumes and the dx radius

In principle, any scatter volume in the E-layer of the ionosphere (105 km) closer than 1150 km may be targeted by the transmitter. The scatter volume disappears below the horizon for longer distances and cannot be accessed (see the circles in figure 2). In the forward-scatter mode of Sporadic-E, any scatterer within the range of vision may fulfill the geometrical requirements for terrestrial radio communication. However, this is not the case for Auroral and FAI backscattering: for example, radio amateurs in the far north of Europe cannot use Auroral backscattering at all because the cone of scattering always opens into space. In other words, it never intersects with the surface of the Earth and, as a consequence, even the strongest Auroral scattering cannot facilitate communication to terrestrial radio stations (this feature may perhaps motivate new types of experiments in amateur radio satellite communication). In principle, all European radio amateurs are at least partially affected by this phenomenon, i.e. each radio station

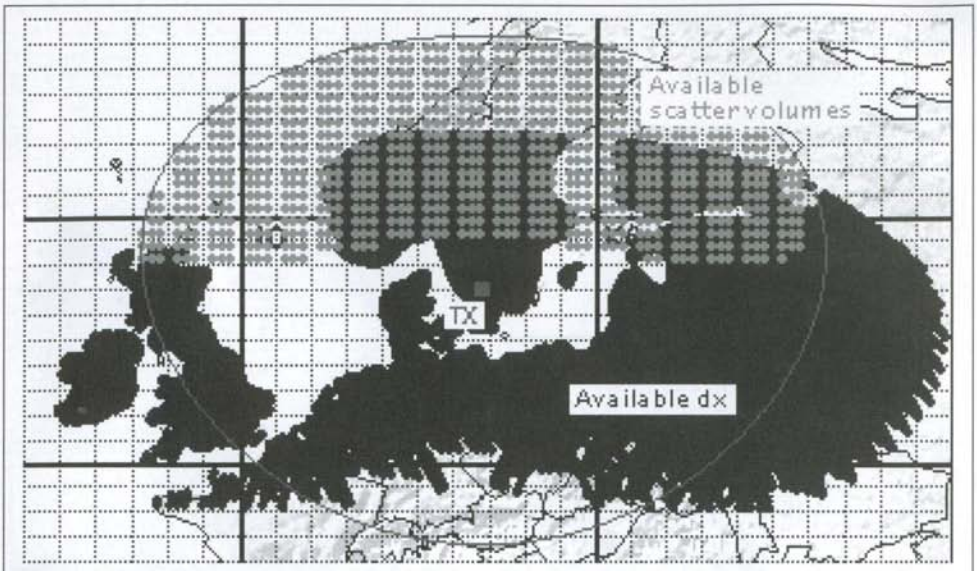


Figure 3: Available scatter volumes (dots) and the DX radius (black) in Aurora and FAI radio propagation. Note that the dots corresponds to locations in the ionosphere (105km), while the black colour corresponds to ground locations. (TX-Locator: JO65)

has a specific range in azimuth for which Aurora and FAI is blanked out.

Using the BeamFinder analysis software, all scatter volumes were calculated in the above example which support terrestrial Aurora and FAI radio propagation (see the dot marks in the upper half of the circle in figure 3). Assuming, these scatterers would all simultaneously provide backscattering, a large number of scatter curves is obtained which reflect the total DX radius in Aurora and FAI radio propagation (i.e. the geographical region in which the scattered radio waves may be received by other radio stations, see the black area in figure 3).

BeamFinder Command Language

The following BeamFinder commands can be used to create displays similiar to that shown in figure 3:

SetRef gridlocator (sets the location of the transmitter)
DrawHorizon 105 (draws the range of vision)
DrawFAISpots 105 (draws the potential scatterers)
DrawFAIDX 105 (draws the access area)

Analysing variations of the DX radius in Europe and North America

The size and the shape of dx radius may change with the transmitter's geographical position considerably. 21 european and 12 northamerican locations were therefore selected to represent the dx ranges in various regions.

References

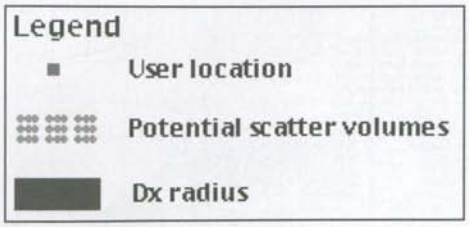
[1] A theory of scattering by nonisotropic irregularities with application to radar reflections from the aurora, Booker, H. G., J. Atm. Terr. Phys. 8, 204-221, 1956

[2] Analyse von Rückstreubeobachtungen ultrakurzer Wellen an Polarlichtern
Czechowsky, P., Diplomarbeit, Max-Planck-Institute for Aeronomie, 1966

[3] Aurora - Ein Computerprogramm zur Analyse von Aurora- und FAI Rückstreuungen
Grassmann, V., DF5AI, Dubus, 1, 18-21, 1988

[4] Aurora - A computer program to analyse Auroral- and FAI-scattering
Grassmann, V., DF5AI, Dubus, 2, 125-126, 1988

[5] The BeamFinder analysis software
Grassmann, V., DF5AI,
http://www.df5ai.net/BeamFinder/bfintro.html



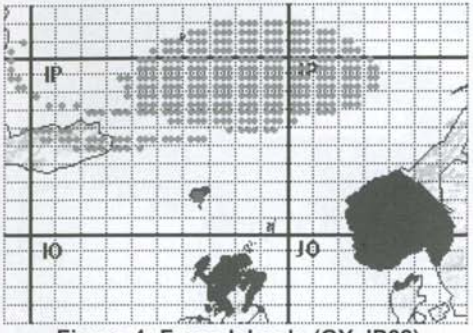


Figure 4: Faroe Islands (OY, IP62)

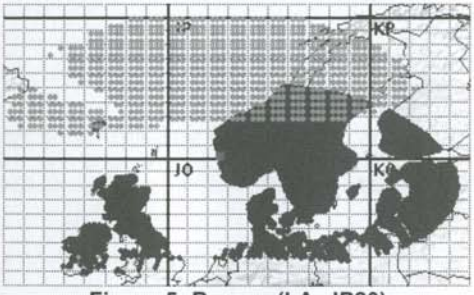


Figure 5: Bergen (LA, JP20)

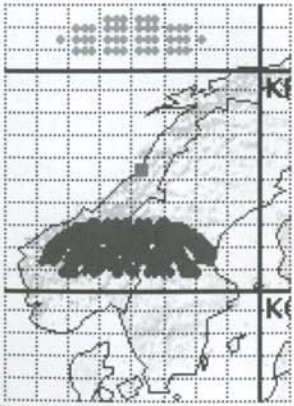


Figure 6: Mosjöen (LA, JP65)

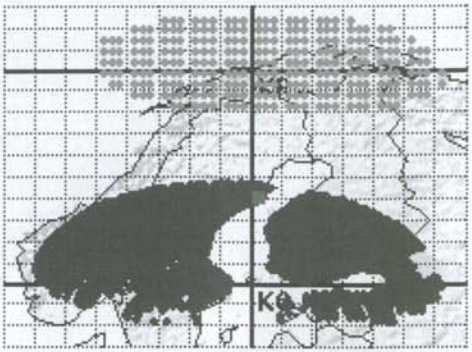


Figure 7: Umea (SM, KP04)

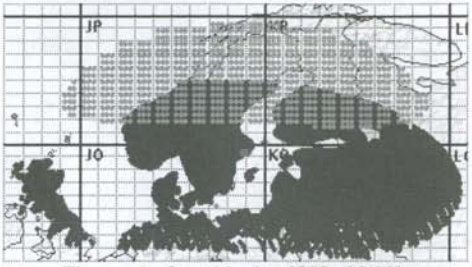


Figure 8: Stockholm (SM, JO99)

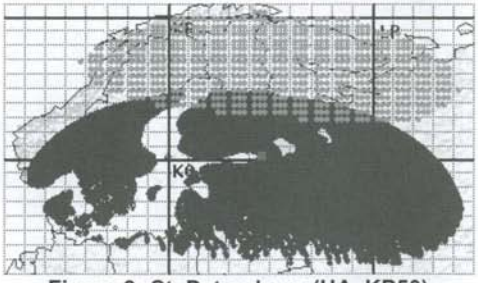


Figure 9: St. Petersburg (UA, KP50)

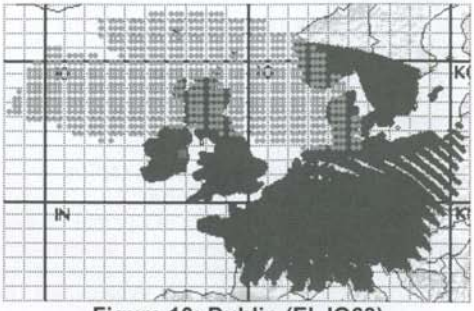


Figure 10: Dublin (EI, IO63)

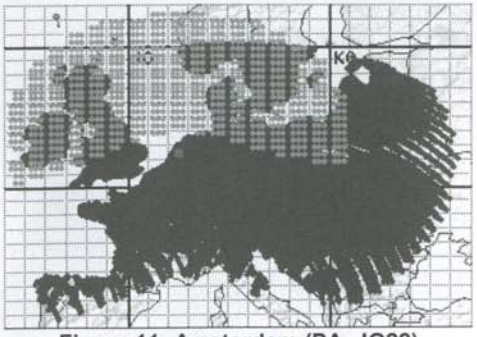


Figure 11: Amsterdam (PA, JO22)

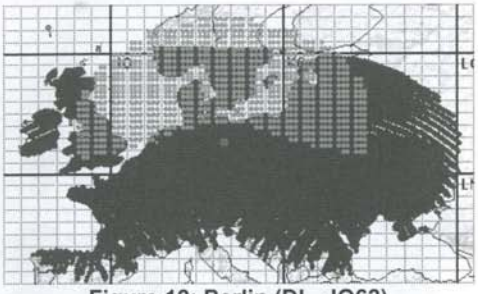


Figure 12: Berlin (DL, JO62)

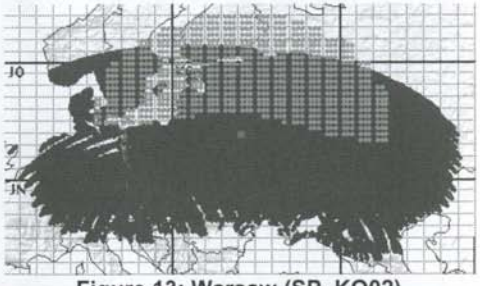


Figure 13: Warsaw (SP, KO02)

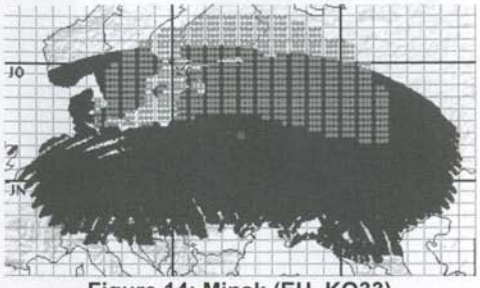


Figure 14: Minsk (EU, KO33)

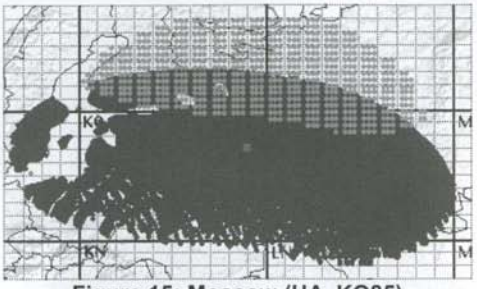


Figure 15: Moscow (UA, KO85)

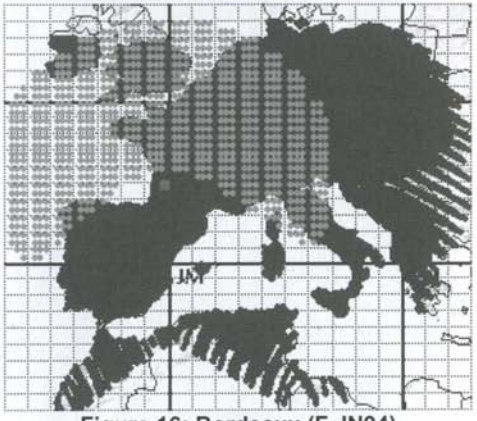


Figure 16: Bordeaux (F, IN94)

Figure 17: Munich (DL, JN58)

Figure 18: Kiev (UR, KO50)

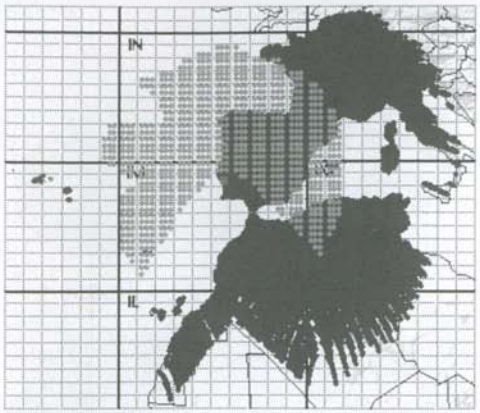


Figure 19: Lisbon (CT, IM58)

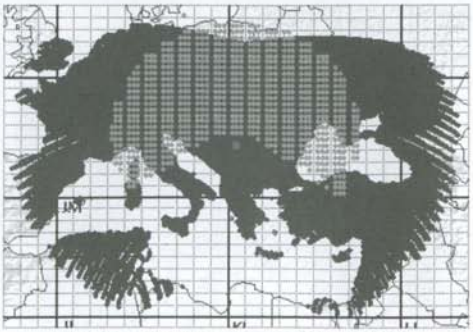


Figure 22: Belgrade (YU, KN04)

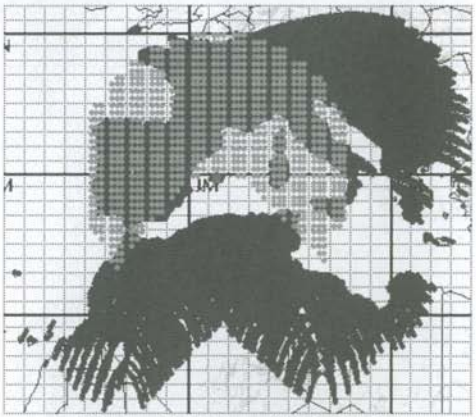


Figure 20: Palma (EA6, JM19)

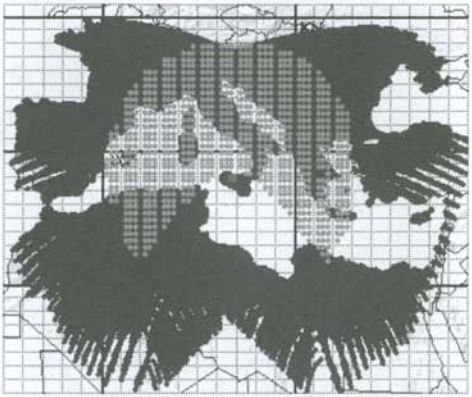


Figure 23: Palermo (IT9, JM68)

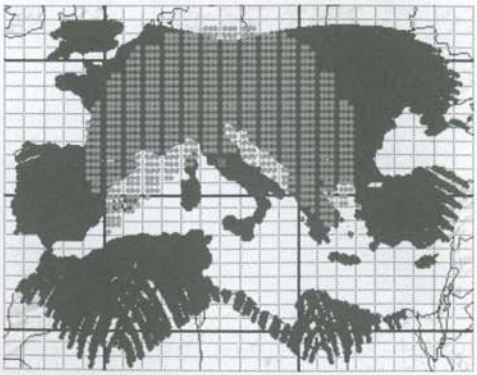


Figure 21: Rome (I, JN61)

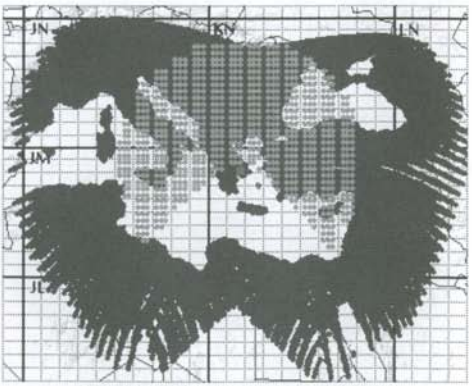


Figure 24: Athens (SV, KM17)

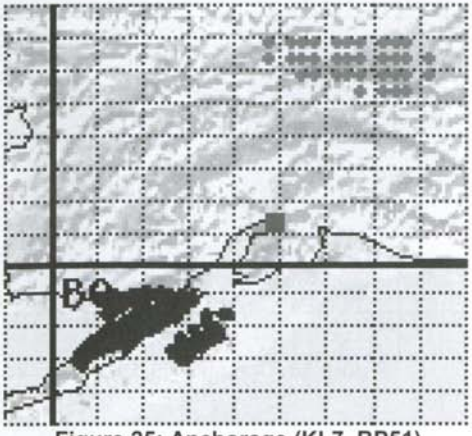


Figure 25: Anchorage (KL7, BP51)

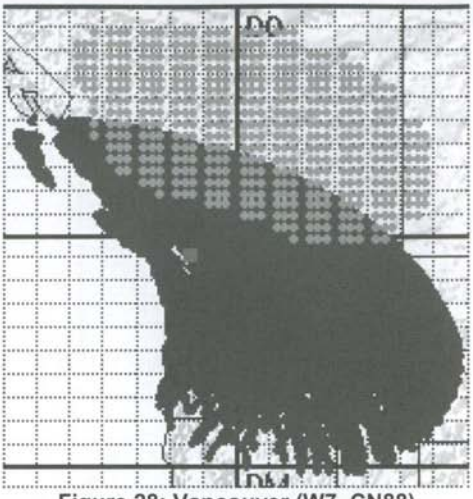


Figure 28: Vancouver (W7, CN88)

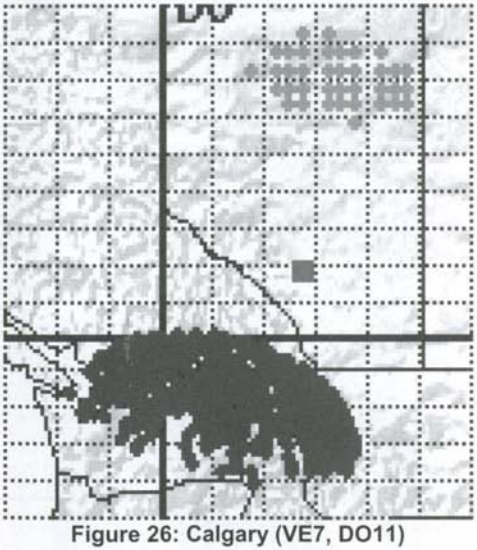


Figure 26: Calgary (VE7, DO11)

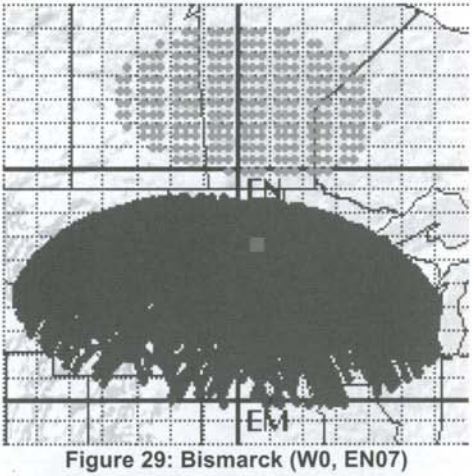


Figure 29: Bismarck (W0, EN07)

Figure 27: Winnipeg (VE5, EN19)
no Aurora/FAI!

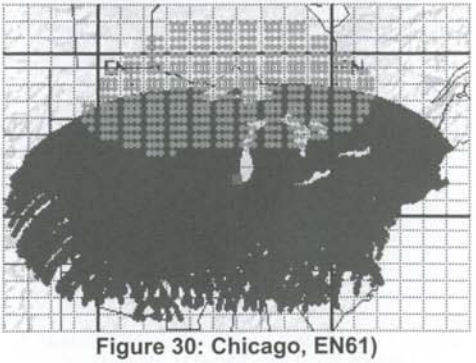


Figure 30: Chicago, EN61)

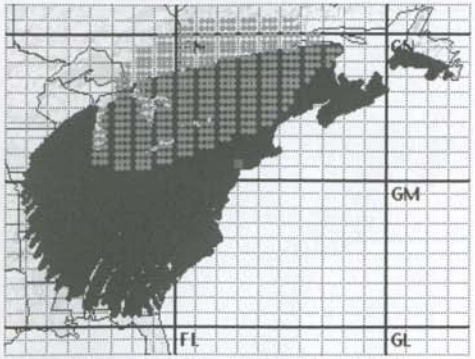


Figure 31: New York (W2, FN30)

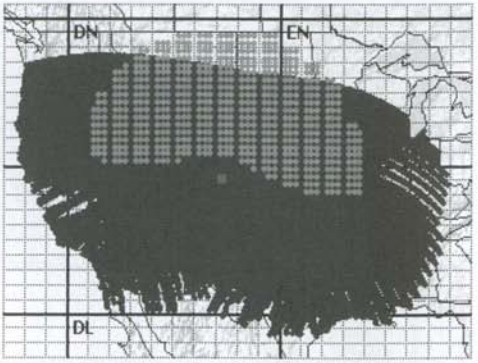


Figure 34: Denver (W5, DM79)

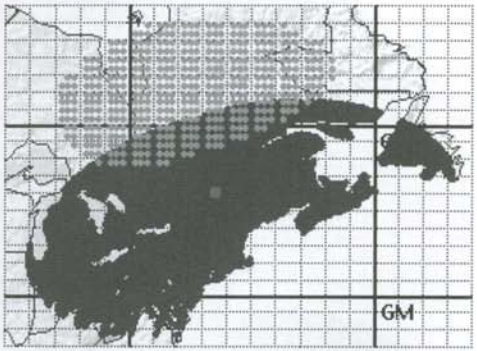


Figure 32: Montreal (VE3, FN35)

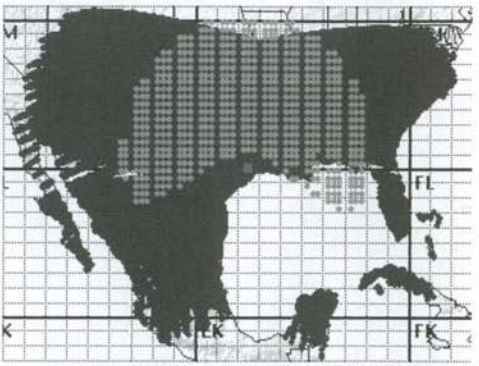


Figure 35: Houston (W5, EL29)

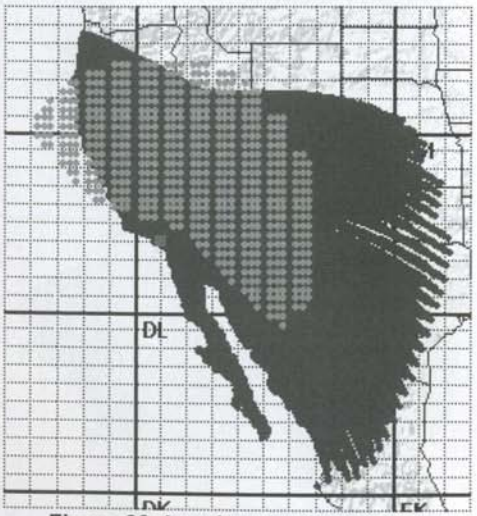


Figure 33: Los Angeles (W6, DM03)

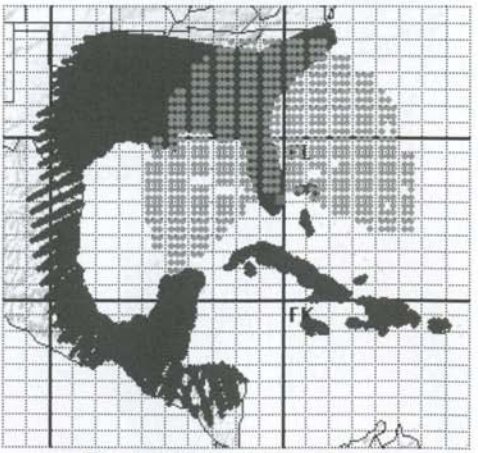


Figure 36: Miami (W4, EL95)

DX-Reichweite bei Aurora- und FAI-Funkverbindungen

Geographische Signatur von Rückstreuungen an erdmagnetfeld-parallelen Irregularitäten

Volker Grassmann, DF5AI

Einleitung

Bei Aurora- und FAI-Funkverbindungen werden Radiowellen an temporären Strukturen (Lebensdauer: Minuten bis mehrere zehn Minuten) in der ionosphärischen E-Schicht (105-110 Kilometer Höhe) gestreut. Der Streuprozeß kann als die rückstreuende Variante von Sporadisch-E Verbindungen angesehen werden, bei der die Richtung der rückgestreuten Wellen mit der Richtung der erdmagnetischen Feldlinie korreliert, welche das Streuvolumen durchsetzt. Vom Sender aus betrachtet findet man das Streuvolumen und die jeweilige Gegenstation daher in erheblich abweichenden Himmelsrichtungen vor.

Dieser Aufsatz untersucht die DX Reichweite bei Aurora- und FAI-Funkverbindungen im europäischen und nordamerikanischen Sektor. In Europe variiert die erdmagnetische Inklination zwischen circa 51 Grad (Südeuropa) und 78 Grad (Nordeuropa), weshalb die DX Reichweite erheblich von der jeweiligen geographischen Position abhängig ist. Beispielsweise beträgt die maximal überbrückbare Entfernung in Südeuropa bis zu 2000 Kilometer, im äußersten Norden Europas sind Aurora- und FAI-Verbindungen jedoch prinzipiell unmöglich.

Die Berechnungen orientieren sich an den in [2] mitgeteilten Untersuchungen, welche das BOOKER'sche Modell für Rückstreuungen an anisotropen Irregularitäten ([1]) anwenden. Das 1988 veröffentlichte AURORA-Programm ist die erste Software im Amateurfunkbereich, die dieses Modell für hochgenaue Aurora- und FAI-Echtzeitanalysen zum Einsatz brachte [3], [4]. In diesem Aufsatz wird das Nochfolgeprogramm BeamFinder ([5]) verwendet.

Die „Scatterkurve"

Die Rückstreugeometrie bei Aurora- und FAI-Funkverbindungen ist im Kasten erklärt. Abb. 2 zeigt ein praktisches Beispiel mit einem Sender (TX), der ein Rückstreuvolumen in nördlicher Richtung anvisiert. Die Kreuze kennzeichnen die berechnete Scatterkurve, d.h. die Schnittlinie zwischen dem Streukegel und der Erdoberfläche.

Das in Abb. 2 gezeigte punktförmige Rückstreuzentrum stellt jedoch eine Idealisierung dar, denn in der Praxis verteilen sich die Rückstreuzentren über ein mehr oder weniger ausgedehntes Gebiet in der Ionosphäre. Die Summe aller zu berücksichtigenden Scatterkurven resultiert daher in einer komplizierten Kurvenschar, welche aufgrund dynamischer Vorgänge in der Ionosphäre zudem zeitlich veränderlich ist. Man beachte ferner, dass die Eigenschaften einer Bandöffnung von der tatsächlichen Ausleuchtung der Rückstreugebiete bestimmt werden und daher von der aktuellen Antennenrichtung und vom jeweiligen Antennendiagramm abhängen.

Die maximale DX Reichweite

Innerhalb einer Entfernung von maximal 1150 km kann ein Sender grundsätzlich jedes Streuvolumen in der ionosphärischen E-Schicht (105-110 km) ausleuchten. In größeren Entfernungen verschwindet das Rückstreugebiet unter dem lokalen Horizont und bleibt (unter der Annahme einer geradlinigen Wellenausbreitung) somit unerreichbar (siehe den roten Kreis in Abb. 2). Bei der vorwärtsstreuenden Sporadisch-E Mode kann daher daher jedes Streugebiet innerhalb des Beobachtungshorizonts terrestrische Funkverbindungen ermöglichen. Im Fall von Aurora- und FAI-Funkverbindungen gelten jedoch weitere geometrische Einschränkungen. Beispielsweise können Funkamateure im hohen Norden Europas keine Aurora-/FAI-Verbindungen verwirklichen, da sich der Rückstreukegel stets in den Weltraum öffnet ohne eine Schnittlinie mit der Erdoberfläche auszubilden.

Im hohen Norden Europas ermöglichen selbst ausgeprägte Aurora-Bandöffnungen daher keine terrestrischen DX-Verbindungen (möglicherweise kann dieser Effekt aber neuartige Ausbreitungsversuche mit Amateurfunk-Satelliten motivieren). Grundsätzlich sind die Funkamateure in allen geographischen Regionen von diesem Effekt betroffen, d.h. jede Amateurfunkstation besitzt einen spezifischen Azimutbereich, in welchem Aurora- und FAI-Rückstreuzentren ausgeblendet sind.

Mit Verwendung der BeamFinder Software wurden alle nutzbaren Rückstreuzentren im vorliegenden Beispiel berechnet (siehe die punktförmigen Markierungen in Abb. 3). Durch die Überlagerung aller zugehörigen Scatterkurven ermittelt man schließlich den maximalen DX Radius bei Aurora- und FAI-Funkverbindungen (d.h. das geographische

Gebiet, in welchem die rückgestreuten Signale des Sender empfangen werden können, siehe die in Abb. 3 gezeigte Fläche).

Vergleich der DX Reichweiten

Die Ausdehnung und die Form der DX-Reichweite kann sich mit der geographischen Position des Senders erheblich ändern. Die Abbildungen zeigen exemplarisch die Situation für verschiedene europäische Regionen. In den Abb. 25 bis 36 werden exemplarische Standorte in Nordamerika analysiert. Diese Beispiele sind auch auf der Webseite http://www.df5ai.net verfügbar, wo auch das Analyseprogramm BeamFinder zum Download zur Verfügung steht.

Abb 1. Der Rückstreukegel bei Aurora- und FAI-Funkverbindungen
Abb 2. Beispiel einer Scatterkurve.
Abb 3. Mögliche Rückstreuzentren (Punkte) und maximale DX Reichweite (Fläche) bei Aurora- und FAI-Funkverbindungen. Man beachte, dass die punktförmigen Markierungen Gebiete in der Ionosphäre (105 km) beschreiben, die zusammenhängende Fläche jedoch Positionen am Erdboden kennzeichnet.

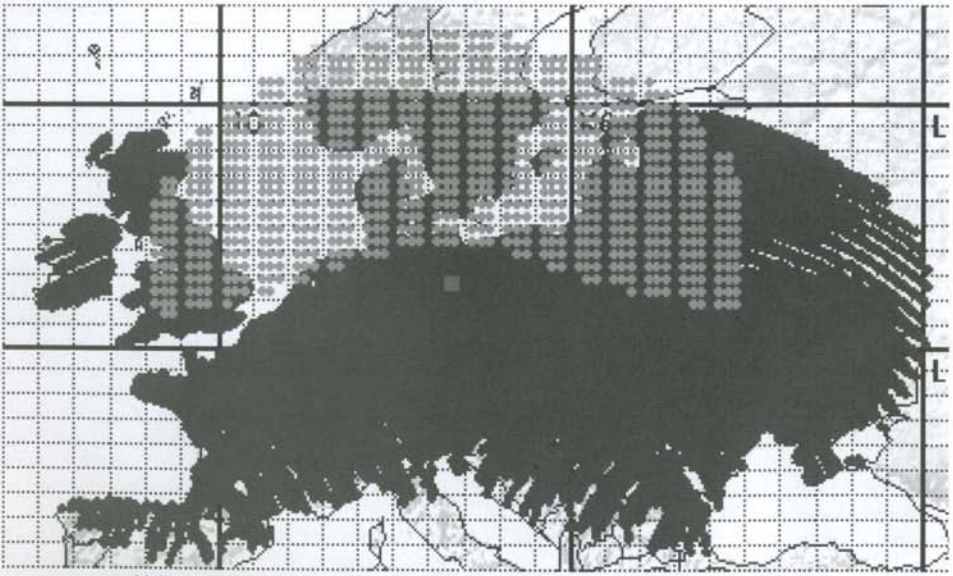


Abb. 12 (vergrößert, für die DL`s): TX-Standort Berlin (DL, JO62)
Schwarz: Die von JO62 maximal erreichbaren Gebiete bei Aurora / FAI

The 2002 European Rain-Scatter Season

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Abstract: The 2002 Rain-Scatter (RS) season in Europe has been one of the best on record; this claim is verified through the number of contacts that have been made, and the breaking of the 3cms, 6cms, and 9cms rain scatter distance records. This article gives statistics on the season from a number of stations logs.

Introduction

With the availability of home computers and the Internet, many amateurs are making their computerised logbooks available on the net for others to read. This is still not a general trend, but what is available can make for very interesting reading. By taking the data from a number of active microwave radio amateurs who have made their logs available on the Internet, it is possible to apply simple text processing tools to extract the required fields and then to make use of a commercially available spreadsheet program to summarise this data graphically. The map was created under Linux using AZ_PROJ [1].

The logbooks used for this paper came from myself HB9DRD in JN47HI [2], OK1JKT in JO60OK [3], PA5DD in JO22IC [4], OZ1FF in JO45BO [5] and DG1VL in JO61XE [6]. Together these logbooks provide data from 492 rain scatter contacts, of which approximately 480 are unique. As will be seen later in the paper, the locations of these stations almost equates to the edges of the European RS activity, and therefore provide very good coverage. For the sake of simplicity, only rain scatter contacts on 3cms are used for the statistics.

Dates/Times and Distances

As has been documented elsewhere (e.g. DUBUS 2/2002, RS on 10 GHz, by DL3NQ) rain scatter occurs when microwave signals are reflected from an area of heavy rain. The quality of the scatter point is related to the strength of the rain in terms of quantity and the shape of the drops, in addition the range is directly related to the height of the scatter point above the ground. The prime sources of rain scatter points are strong thunderstorms usually after a very hot summers day. This in turn means that rain scatter activity is mostly confined to the summer months, typically early May until late August, at least for stations in Western Europe.
The graph in figure 1 shows the number of rain scatter contacts by month.

The curve shows a build up in the number of contacts from late April, reaching a peak in early July and then a slow decrease until finishing in late August. At lower latitudes the season lasts longer with contacts being reported between Italy and Slovenia in early September. The peak in early July (9th July) is interesting because the activity was high despite it being on a Tuesday when most stations would not have been active until after work hours.

The second highest peak was on the 18th June that was part of a series of openings that extended from the 15th to the 23rd of June; this included the 20th when the 9cms, 6cms and 3cms distance records were broken. The joint third highest peaks are on the 6th July that was helped by it being one of the largest microwave contests, and the 31st July.

Another question to ask is whether the distances worked are related to the time of year. The accepted maximum rain scatter range is taken to be approximately 800kms, and this is usually associated with a very strong storm after a hot day. Using the same data, figure 2 shows the best distances worked versus the date. As can be seen there is no distinct peak in the distances worked, once the season starts in May then the best distances are already around 500kms, and gradually increase until they reach a peak at the end of July.

The distances then decrease more quickly than they originally increased; the curve appears to be asymmetric. It would be good to do further research to determine whether this pattern is typical or specific to the 2002 season.

The next area to investigate is time. Experience of thunderstorms in real life leads towards the conclusion that rain scatter should be a late afternoon/evening mode. Plotting the number of contacts relative to the time appears to bear this out.

However there is one problem, most amateurs have to go to work and cannot usually operate before 1600 UTC except at weekends. This fact can ensure that a simple plot of time versus the

number of contacts can give the wrong information. A plot of time versus distance would more closely indicate whether usable thunderstorms occur earlier than figure 3 would indicate.

Figure 4 shows that very usable rain scatter openings occur at times when many stations are not active due to other commitments. Indeed it would appear that many good rain scatter openings are being missed, the only chance to work these openings occur either at weekends or on days off. Being active during one of these morning or early afternoon openings is of course no guarantee of working anyone!

Personal experience of rain scatter does indicate that after 2000 UTC rain scatter conditions often start to fade away, therefore this decrease is not caused by amateurs going to bed.

Modes

Rain scatter is a non-coherent scatter mode, as is Aurora on the lower bands. This means that signals that pass through a rain scatter point are distorted to a greater or lesser extent. Minimum distortion occurs when the scattering is along the direct path, and signals in such a case can sound almost as if they are a tropo signal. The signal becomes progressively more distorted as the reflection angle increases. Once the reflection angle reaches 90°, known as side-scatter, the distortion is already large, once the reflection angle gets close to 180° (back-scatter) the distortion is at its worst.

The most effective mode to use in rain scatter is CW, as it is for Aurora. Even a weak CW signal is more understandable than a strong SSB signal unless the reflection angle is low. Analysis of the logs gives the distribution of operating modes in table 1.

Table 1: Mode Usage

Mode	Percentage
CW	74%
SSB	22%
FM	4%

The choice of operating mode is down to personal preference, but in the cases of side-scatter and backscatter CW is the most effective mode to use.

When signals are very strong it is possible to use FM. FM has the advantage that the distortion that is heard on SSB and CW is not audible on an FM signal making for a very pleasant contact.

However concern has been raised about the potential for interference from the FM sidebands when FM contacts takes place close to SSB and CW activity. Currently it is common to use FM on 10368.200 MHz; perhaps moving even higher in frequency is needed as activity increases, to allow space for SSB and CW stations to spread in frequency without interference.

Activity

Rain scatter activity is centred on Germany as can be seen in figure 5, this is not surprising considering the healthy state of V/U/SHF operation in that country, what is more surprising is the activity from some other countries. Table 2 gives activity statistics from the logs.

Table 2: Activity by Country

Country	RS Stations	Proportion
Germany	73	0.089%
Czech Republic	23	0.322%
Austria	15	0.230%
Netherlands	12	0.082%
Denmark	5	0.050%
Poland	4	0.025%
Slovenia	4	0.059%
Switzerland	4	0.072%
Great Britain	3	0.005%
Italy	3	0.01%
France	2	0.010%
Hungary	2	0.023%
Luxemburg	2	0.344%
Slovakia	2	0.194%
Sweden	1	0.009%

The proportion column refers to the percentage of active rain scatter stations relative to the total amateur radio population for that country.

What is probably more surprising from these figures are the omissions. There are no Belgian stations reported in any of the logs, even in the log from PA5DD who is relatively close. The French are also very under-represented here. I hope that amateurs in these countries will start to appear more in the future. In particular, microwave activity in France is high, with a number of high profile operators, however that does not appear to translate into rain scatter operation.

A noticeable trend has been the increase in microwave activity in Eastern Europe. This is probably related to the increase in prosperity of these countries as their markets mature, however that is beyond the scope of this article.

Prediction and Co-Ordination

There are two areas where the Internet can be of great help to rain scatter operators, the first is in predicting rain scatter openings and the second is in the co-ordination of activity.

As has been mentioned earlier, rain scatter openings are directly related to storms. As rain and storms are of general interest to the public as well as microwave operators, many companies and organisations make this data freely available on the Internet, for central Europe the weather radars in [7] provide probably all of the data that most operators will ever need. It does not matter that the data may be delayed by thirty minutes to one hour, they are still extremely useful. An alternative technique is to detect the rain scatter points directly by way of radar; this is done by OE5VRL and can be read about in [8]. This latter technique provides accurate real-time data, however the use of a 3m dish precludes its use by many people.

Even when a scatter point is found, finding active stations to work can be a problem. It is not uncommon to have more than one scatter point active at a given time, and it is important for making contacts that all the stations use the same one. Probably the best way to do this is to make use of the WW Converse system on channel 10368, where many of the active rain scatter stations are active, especially during rain scatter openings. It has been the case that a number of very impressive rain scatter contacts has been co-ordinated in this manner. Unfortunately for a /P station, accessing this system may not be that easy, however the next generation of mobile phones with data capability may be the long term solution to this problem.

The DX Cluster network is also very useful, but its real strength lies in reporting contacts after they have been made, as a co-ordination tool it is not as good as the Converse system.

Equipment

Unfortunately details of the equipment used are not available in the logs, and usually has to wait until the QSL card arrives. Although rain scatter contacts can be made with 200mW from a barefoot DB6NT transverter, more power makes rain scatter contacts much easier. Although I have no statistics to back this up, I believe that the "average" active 3cms rain scatter station uses 5W and a 60cms dish, with a few stations using 10W or more. It has been mentioned a number of times that having too large a dish for rain scatter can be a disadvantage, and 90cms is usually the maximum size used. It is important to have some form of elevation control for accessing more local rain scatter points.

Records

The 2002 rain scatter season has seen three rain scatter records broken. The most impressive of these were the contacts between DL6NCI/DB6NI (JO50VI) and IW4CJM/P (JN72MA) on the 20th June at a distance of 960kms. In this case there is reason to suspect that there was some sea ducting present at the Italian end of the contact, which increased the normal rain scatter range. What is also impressive is that DF2CK (JO71AD) heard the signals from IW4CJM/P at 1018kms and also by SP7JSG (KO01BW) at 1168kms. There is no reason to suspect that this contact was a unique occurrence, and it is possible as activity increases in Italy, that these sorts of contacts will become an annual event. More information about this record breaking contact can be found at [9].

The 6cms rain scatter record was also broken. This was done by PA0BAT (JO31FX) working OK2DL (JN89BO) also on the 20th June at a distance of 729kms, as far as is known this was a pure rain scatter contact. It is possible that the 6cms record could be as great as that for 3cms, the problem being the lower activity levels on that band.

The 9cms rain scatter record is also held by PA0BAT and OK2DL, and was also made on the 20th June, quite probably one of the best days for rain scatter in the whole season. Unfortunately 9cms is not available to stations in Belgium, Switzerland and Austria and possibly others, which limits both the potential activity and distances.

Further Investigation

A fruitful area of further investigation is the location of scatter points. Although storms, and hence scatter points, can happen almost anywhere, the reality is that specific areas attract storms. Hilly or mountainous ground such as the Black Forest and the Alps are prone to storms, and in the latter case allows stations in Italy to work north of the Alps as in the 3cms RS record. A series of articles appeared in Radio Communication [10] that went into detail about the mechanics of thunderstorms and were written by a professional meteorologist.

In order to investigate this, it is necessary for details of the azimuth of both stations in the contact to be logged; this would enable the scatter point to be calculated. Many stations include azimuth data in their spots on the DX Cluster, unfortunately when researching this paper I was not able to find an archive of the 3cms cluster data that covered the whole of the rain scatter season, such a resource would be invaluable.

Conclusions

The 2002 rain scatter season has been one of the best, with three rain scatter distance records being broken and high activity. It is to be hoped that this trend continues and we see even higher activity and records being broken in the future.

References

[1] AZ_PROJ by NA3T and NV3Z (http://www.wm7d.net/azproj.shtml)
[2] http://www.qsl.net/g4klx
[3] http://www.qsl.net/ok1jkt
[4] http://home.hccnet.nl/uffe.noucha
[5] http://www.oz1ff.dk
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[8] http://www.dl6nci.de/oe5vrl.htm
[9] http://www.dl6nci.de/tropo.htm
[10] J. Bacon, G3YLA, "An Introduction to Sporadic E", Radio Communication, May, June, July and August 1989.

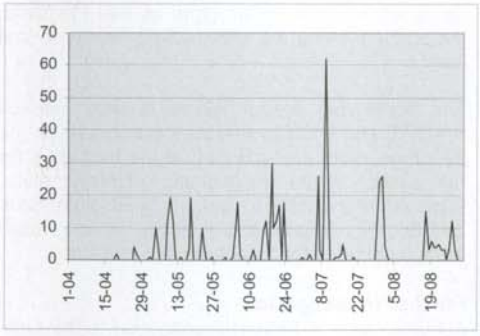


Figure 1: Date vs Number of Contacts

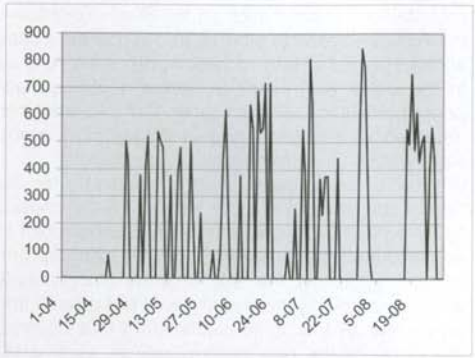


Figure 2: Date vs Distance

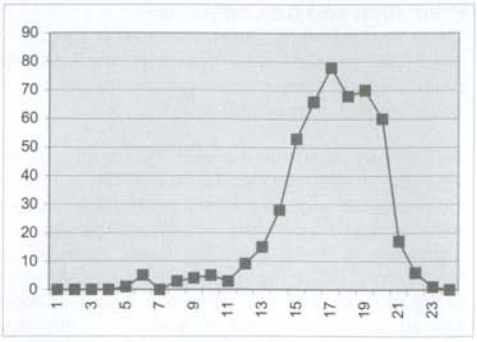


Figure 3: Time vs Number of Contacts

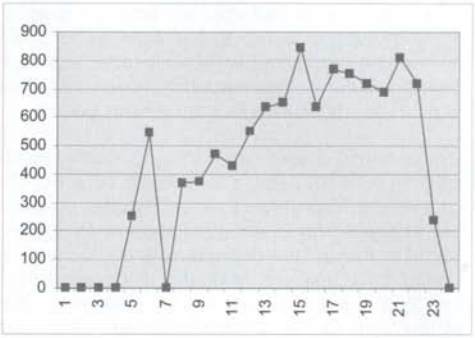


Figure 4: Time vs Distance

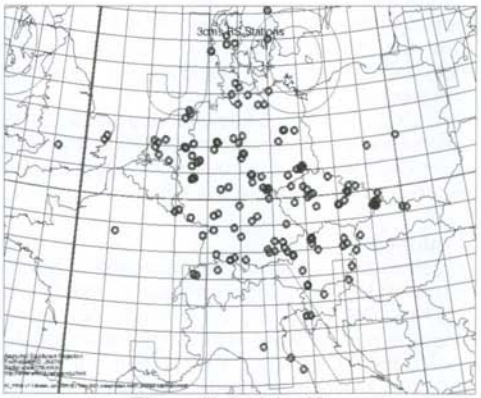


Figure 5: Activity Map

Ed: Jonathan wants to make also summary reports on RS-QSOs from 1997 to 2001 and from 2003 onwards. We ask our readers to send their logs to him or DUBUS: info@DUBUS.de

Microwave Parts

HMJ5 / HMJ7 FET-Mixer
Watkin Johnson (www.wj.com) bietet einen für Funkamateure interessanten FET-Mixer an.

(http://www.wj.com/rf_components/mixers.asp)

Der **HMJ5** ist wohl der Mixer mit dem zur Zeit höchsten IPIP3 (+35 dBm); gemessen (OPIP3 = 30,6 dBm, G = -6 dB, Ubias = 3,3 V, Diplexer an allen Ports). Er hat ideale Anpassungswerte bei 2m, und ist brauchbar für 2m und 70 cm.

HMJ5
High Dynamic Range FET Mixer

The Communications Edge™

Product Features

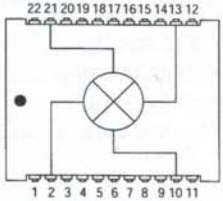
- +35 dBm IIP3
- No external matching element Required
- RF 40-1000 MHz
- LO 30-900 MHz
- IF 5-250 MHz
- +17 dBm LO Drive Level
- +3V at 35 mA DC Power Supply
- Low Cost Surface Mount J-Lead Package

Product Description

The HMJ5 is a high dynamic range, GaAs FET mixer. This active FET mixer realizes a typical third order intercept point of +35 dBm at an LO drive level of +17 dBm. The HMJ5 comes in a low cost, J-Lead package. Typical applications include frequency up/down conversion, modulation and demodulation for receivers and transmitters used in communications systems.

• UPDATED •
+17 dBm LO Drive

Functional Diagram



Function	Pin No.	Function	Pin No.
Ground	1	Ground	12
IF	2	LO	13
Ground	3-9	Ground	14-20
+3V DC	10	RF	21
Ground	11	Ground	22

Specifications

Parameter	Units	Minimum	Typical	Maximum	Condition
Frequency Range:					
RF	MHz	40		1000	
LO	MHz	30		900	
IF	MHz	5		250	
SSB Conversion Loss	dB		7.5	9.0	
SSB Noise Figure	dB		9.5		
Isolation:					
LO to RF	dB	20	28		
LO to IF	dB	24	30		
IIP3	dBm	31	35		RF = 900 MHz (0 dBm)
Return Loss:					
RF Port	dB		11.7		
LO Port	dB		6.0		
IF Port	dB		10.9		
Input P1dB	dBm		23		
LO Drive Level	dBm		17		
DC Current at +3V Bias	mA		35	60	

Notes:
1. RF = 905 MHz (-10 dBm) LO 900 (+17 dB) IF = 5 at 25°C.
2. Measured in a 50-ohm system with nominal LO drive in a downconverter application only, unless otherwise specified.
3. LO frequency must be separated from IF frequency by a minimum of 2 MHz (i.e., $|F_{LO} - F_{IF}| \geq 2$ MHz).

Absolute Maximum Ratings

Parameter	Rating
Operating Case Temperature	-40 to +85°C
Storage Temperature	-65 to +100°C
Maximum Input Power	+25 dBm

1. Operation of this device above any of these parameters may cause permanent damage.
2. Total sum of LO port and RF port power should not exceed 25 dBm.

Ordering Information

Part No.	Description
HMJ5	High Dynamic Range FET Mixer (Available in tape and reel)
HMJ5-PCB	Fully Assembled Application Circuit

HMJ7 ist das Pendant für das 23 cm Band, wurde aber noch nicht durchgemessen.

Watkin Johnson offers new high level FET mixers. HMJ5 is the version for 2m and 70cm, HMJ7 for 23cm.

HMJ7

High Dynamic Range FET Mixer

The Communications Edge™

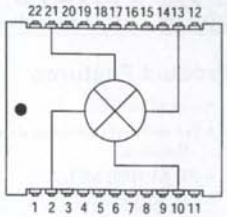
Product Features

- +34 dBm IIP3
- 60 dBc Spurious Rejection in IF Band
- RF 1000-2000 MHz
- LO 1000-2000 MHz
- IF 10-1000 MHz
- +21 dBm LO Drive Level
- +5V Bias (40 mA)
- Low Cost Surface Mount J-Lead Package

Product Description

The HMJ7 is a high dynamic range, GaAs FET mixer. This active broadband mixer realizes a typical third order intercept point of +34 dBm at an LO drive level of +21 dBm. The HMJ7 also provides excellent suppression of spurious intermodulation products, greater than 60 dBc. The HMJ7 comes in a low cost, J-Lead package. The combination of high dynamic range and spurious suppression, makes the HMJ7 an ideal choice for CATV headend transmission equipment and other applications requiring a broadband mixer in the 1000 MHz to 2000 MHz frequency range.

Functional Diagram



Function	Pin No.	Function	Pin No.
Ground	1	Ground	12
IF	2	LO	13
Ground	3-9	Ground	14-20
+5V DC	10	RF	21
Ground	11	Ground	22

Specifications

Parameter	Units	Minimum	Typical	Maximum	Condition
Frequency Range:					
RF	MHz	1000		2000	
LO	MHz	1000		2000	
IF	MHz	10		1000	
SSB Conversion Loss	dB		8.5	9.5	
Noise Figure	dB		10.5		
Isolation:					
LO-RF	dB	21	24		
LO-IF	dB	24	30		
RF-IF	dB		24		
IIP3	dBm	24	34		RF = 1500 MHz (0dBm)
Return Loss:					
RF Port	dB		10		
LO Port	dB		5		
IF Port	dB		14		
Spurious Rejection	dBc		60		
Input P1dB	dBm		23		
LO Drive Level	dBm		21		
DC Current at +5V Bias	mA		40	60	

Test conditions unless otherwise stated: RF = 1500 MHz (-10 dBm), LO = 1490 MHz (21 dBm), IF = 10 MHz and 25°C.

Absolute Maximum Ratings

Parameter	Rating
Operating Case Temperature	-40 to +85°C
Storage Temperature	-65 to +100°C
Maximum Input Power	25 dBm

1. Operation of this device above any of these parameters may cause permanent damage.
2. Total sum of LO port and RF port power should not exceed 25 dBm.

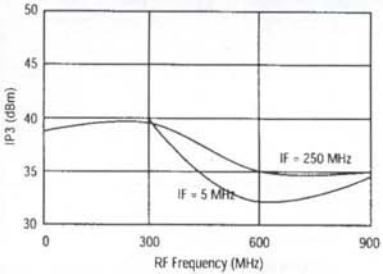
Ordering Information

Part No.	Description
HMJ7	High Dynamic Range FET Mixer (Available in tape and reel)
HMJ7-PCB	Fully Assembled Application Circuit

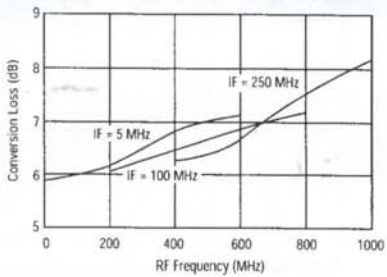
WJ Communications, Inc. • Phone: 1-800-WJ1-4401 • FAX: 408-433-5649 • e-mail: sales@wj.com • Web site: www.wj.com

September

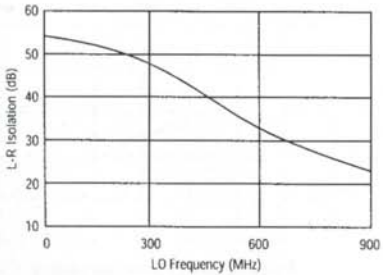
IP3 vs. RF Frequency



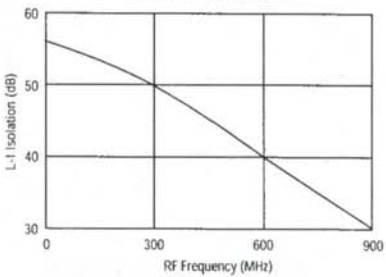
Conversion Loss vs. RF Frequency



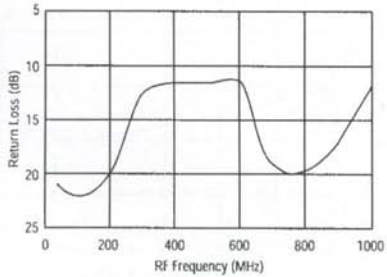
LO to RF Isolation



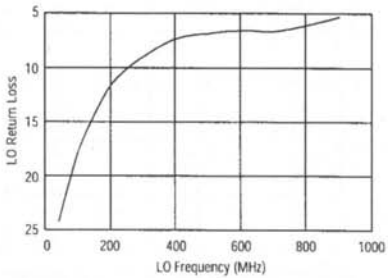
LO to IF Isolation



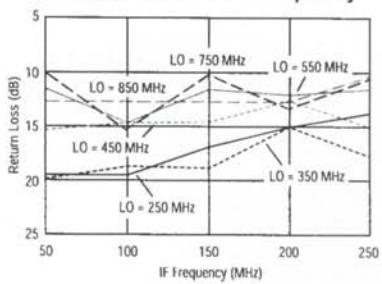
RF Port Return Loss



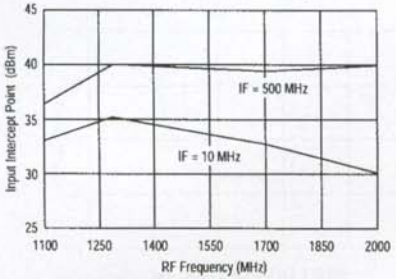
LO Port Return Loss vs. LO Freq



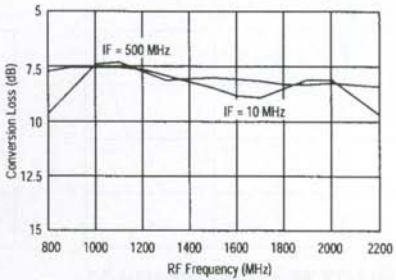
IF Return Loss vs. IF Frequency



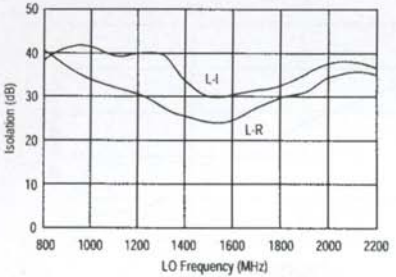
IIP3 vs. RF Frequency



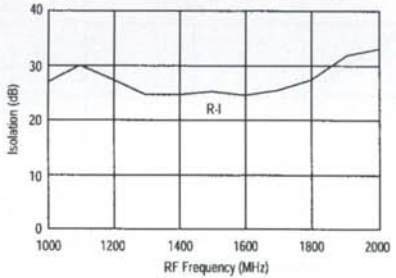
Conversion Loss vs. RF Frequency



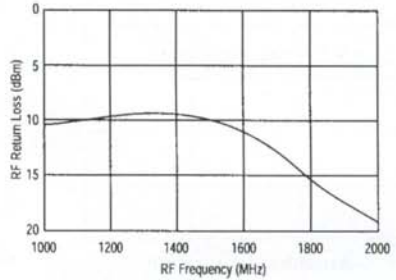
Isolation vs. LO Frequency



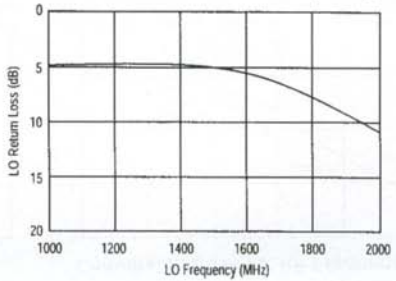
Isolation vs. RF Frequency



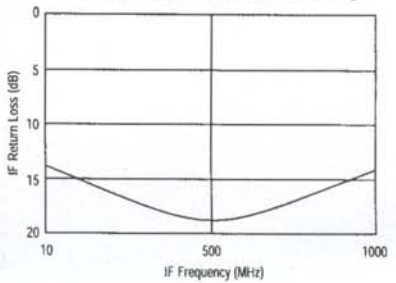
RF Return Loss vs. RF Frequency



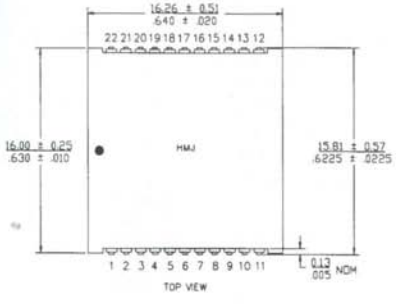
LO Return Loss vs. LO Frequency



IF Return Loss vs. IF Frequency

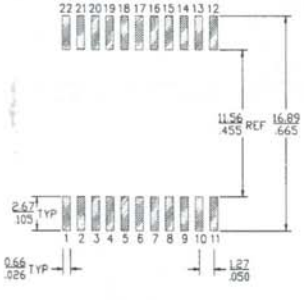


Outline Drawing

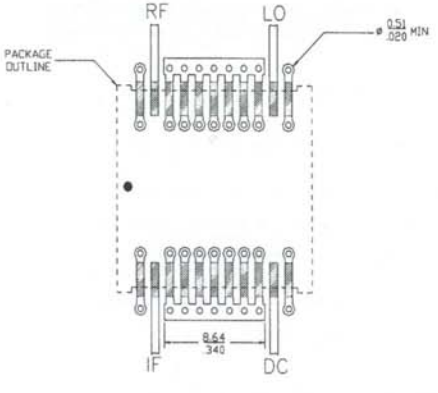


mm
inch

Land Pattern



Mounting Configuration



FUNCTION	PIN NO.	FUNCTION	PIN NO.
GROUND	1	GROUND	12
IF	2	LO	13
GROUND	3-9	GROUND	14-20
DC	10	RF	21
GROUND	11	GROUND	22

Notes:
1. Ground vias are critical for thermal and RF grounding considerations.
2. A minimum of 36 ground vias are required for 14 mil FR4 board.
3. If your PCB design rules allow, ground vias should be placed under the land pattern for better RF and thermal performance. Otherwise ground vias should be placed as close to land pattern as possible.
4. Trace width depends on PC board.

FH1
High Dynamic Range FET

The Communications Edge™

Advanced Product Information

Product Features

- 50-3000 MHz Bandwidth
- +42 dBm Output IP3
- 1.2 dB Noise Figure
- 18 dB Gain
- +21 dBm P1dB
- Single or Dual Supply Operation
- MTBF >100 Years
- SOT-89 SMT Package

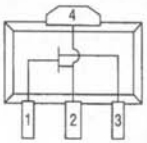
Actual Size

Product Description

The FH1 is a high dynamic range FET packaged in a low cost surface mount package. The combination of low noise figure and high output IP3 at the same bias point makes it ideal for receiver and transmitter applications. The FH1 achieves +42 dBm OIP3 at a mounting temperature of 85°C with an associated MTBF of >100 years. The package is a SOT-89. All devices are 100% RF and DC tested.

The product is targeted for applications where high linearity is required.

Functional Diagram



Function	Pin No.
Gate	1
Source	2
Drain	3
Source	4

Specifications

DC Electrical Parameter	Units	Min.	Typical	Max.
Saturated Drain Current, Idss	mA	100	140	170
Transconductance, Gm	mS		120	
Pinch Off Voltage, Vp	V	-3.0	-1.5	

RF Parameter	Units	Min.	Typical	Max.
Small Signal Gain, Gss	dB	17	18	
Max Stable Gain, Gmsg	dB		23	
Output IP3	dBm	38	42	
Output P1dB	dBm		21	
Noise Figure, NF[7]	dB		1.2	

Notes:
1. DC and RF parameters measured under the following conditions unless otherwise noted. 25°C with Vds = 5.0 V, Vgs = 0 V, test frequency = 800 MHz, 50 Ω system.
2. OIP3 measured with two tones at an output power of 5 dBm/tone separated by 10 MHz. The suppression on the largest IM3 product is used to calculate the OIP3 using a 2:1 slope rule.
3. Device needs appropriate match to become unconditionally stable.
4. Degradation of OIP3 occurs at low temperatures. Minimum typical OIP3 at -40°C is +36 dBm.
5. Idss is measured with Vgs = 0 V.
6. Pinch off voltage is measured when Ids = 0.6 mA.
7. Measured with Vds = 3.3 V, 50% Idss.

Typical Parameters

Parameter	Units	Typical	
Frequency	MHz	900	1900
S21	dB	19.0	16.0
S11	dB	-10.7	-12.3
S22	dB	-9.7	-17.2
Output IP3	dBm	+44.0	+39.6
Output P1dB	dBm	+21.8	+22.1
Noise Figure	dB	2.7	3.1
Drain Bias Supply		5 V @ 140 mA	
Gate Bias		0 V	

Typical parameters reflect performance in an application circuit.

Absolute Maximum Ratings

Parameter	Rating
Drain to Source Voltage	+6.0 V
Gate to Source Voltage	-6.0 V
Gate Current	4.5 mA
Operating Case Temperature	-40 to +85°C
Storage Temperature	-55 to +125°C
Input RF Power (continuous)	+10 dBm

Operation of this device above any of these parameters may cause permanent damage.

Ordering Information

Part No.	Description
FH1	High Dynamic Range FET (Available in tape and reel)

FH1 – FET

WJ offers also a new high dynamic range FET, the **FH-1**, achieving +42 dBm OIP3 on 2m and F between 1 and 2 dB. The FH-1 should be interesting for LNA use on 2m.

Ebenfalls von Watkin Johnson gibt es unter der Bezeichnung FH-1 einen FET mit großem Dynamikbereich, der für LNAs einsetzbar ist.
(http://www.wj.com/rf_components/fets.asp)
In Testschaltung (Gegenkopplung Drain-Gate = 1 k 1nF, 10 R vom Drain zum Ausgang, siehe Appnote 240MHz (www.wj.com/appnotes/index.asp), umgebaut auf 145 MHz, P1dB = 21 dBm, OPIP3 > +42 dBm, F liegt zwischen 1 und 2 dB, mangels Rauschzazahlmessgerät nicht bestimmt, jedoch aufgrund von Systemsimulationen eines kommerziellen Frontends müsste F = 1,75 dB realistisch sein.

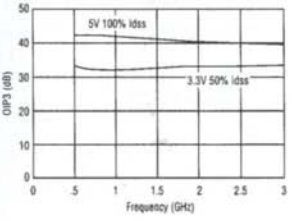
Vorteil des FH1: es ist zwar ein FET, er kann jedoch bei IDSS d.h. UGS = 0 V betrieben werden, benötigt also keine negative Vorspannung!
Seit kurzem ist auch eine Appnote über einen 45 - 65 MHz LNA (6 m!) verfügbar.

FH1

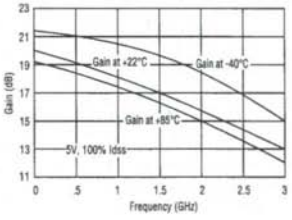
Advanced Product Information

Performance Charts (Vds = 5.0 V, Ids = 150 mA, T = 22°C, 50 ohm system)

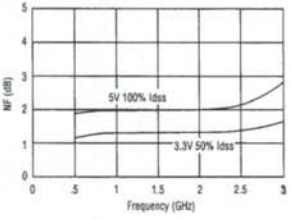
OIP3 vs. Frequency



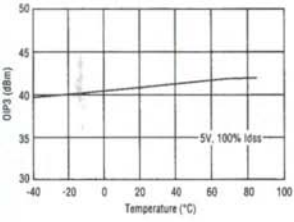
Gain vs. Temperature



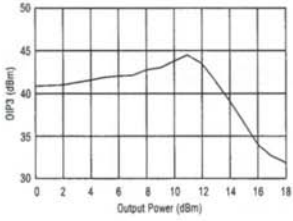
NF vs. Frequency



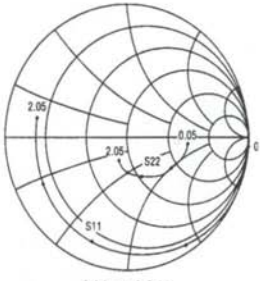
OIP3 vs. Temperature



OIP3 vs. Power Out



S-Parameters



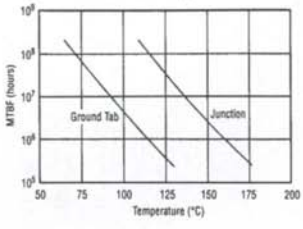
S11 and S22

Thermal Specifications

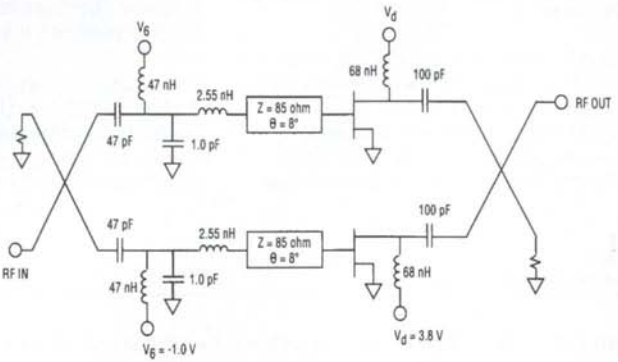
Parameter	Rating
Operating Case Temperature	-40 to +125°C
Thermal Resistance (Maximum)	59°C/W
Junction Temperature (Recommended Maximum)	+155°C

Notes:
1. Thermal Resistance determined at Maximum Tab Temperature and Maximum Power Dissipation.
2. Recommended Maximum Junction Temperature insures a MTBF of 1 million hours.

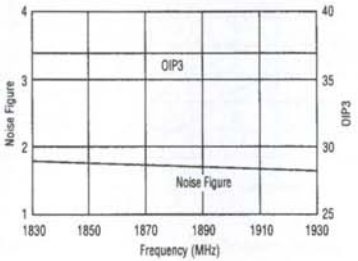
MTBF vs. Temperature



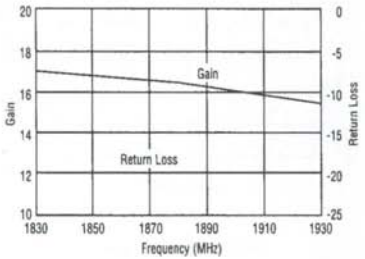
Low Noise Application Circuit (1880 MHz Balanced Amplifier)



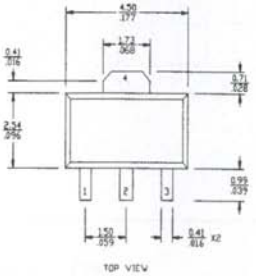
Noise Figure and OIP3 vs. Frequency



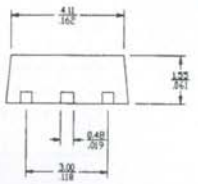
Gain and Return Loss vs. Frequency

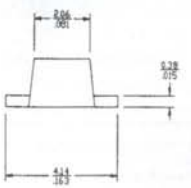


Outline Drawing



mm
inch





FH1 Application Circuit at 240 MHz

Summary:
This application note details the operation and schematic of an application circuit using a WJ Communications FH1 device optimized for Noise Figure at 240 MHz, while providing high linearity (OIP3 = 42 dBm). This circuit is unconditionally stable and offers a gain of 17 dB with excellent input and output VSWR. The WJ Communications low-cost FET requires only single supply that can be sourced directly from a voltage regulator. This circuit is ideal for use as high linearity low-noise driver amplifiers for infrastructure equipment.

Frequency	240 MHz
S21 - Gain	16.9 dB
S11 - Input R.L.	-16.0 dB
S22 - Output R.L.	-27.5 dB
S12 - Isolation	-24.7 dB
Output IP3[1]	42 dBm
Noise Figure	1.75 dB
Bias	5 V at 150 mA

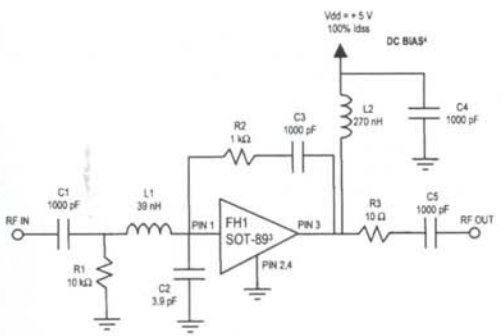
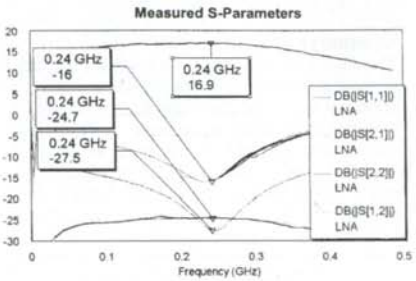
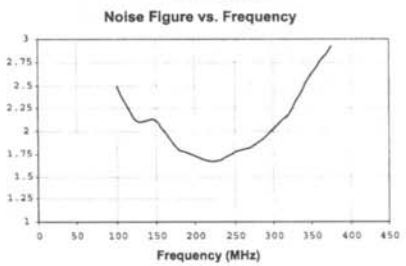
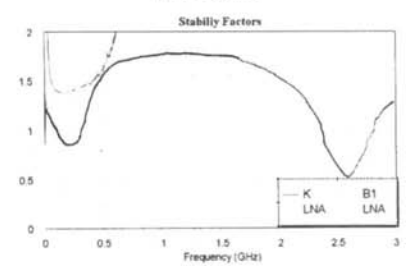


Fig 1. 240 MHz Circuit Schematic[2]







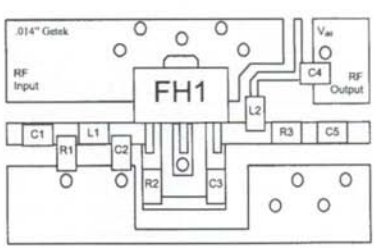


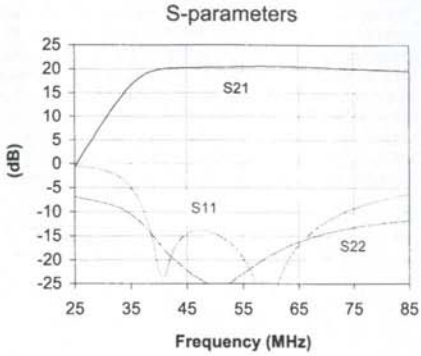
Fig. 2. 240 MHz Sample Board Layout

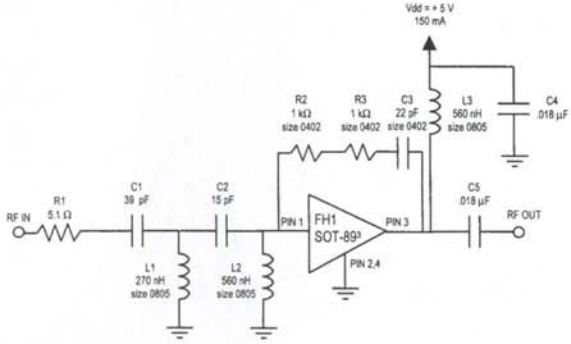
1 OIP3 is measured with 2 tones at an output power of 5 dBm/tone with 10 MHz spacing. The suppression on the largest IM3 product is used to calculate OIP3 using a 2:1 slope rule. Test parameters were taken at 25 °C.
2 All components are 0603 size. All components can be standard 5% tolerance parts. Toko LL1608-FH chip inductors and AVX capacitors were used in the design.
3 The FET should be mounted as shown in the FH1 datasheet.
4 The application circuit should be biased directly into a constant voltage DC regulator. A dropping resistor is NOT required for biasing this device.

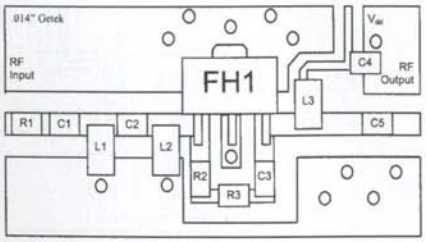
FH1 Application Circuit for 45 – 65 MHz

Summary:
This application note details the operation and schematic of an application circuit using a WJ Communications FH1 device optimized for the IF frequency band of 45 – 65 MHz. This circuit is unconditionally stable and offers a gain of 20 dB while providing excellent performance for IP3, P1dB, and noise figure. The WJ Communications low-cost FET requires only single supply that can be sourced directly from a voltage regulator.

Frequency (MHz)	45	55	65
S21 - Gain (dB)	20.3	20.5	20.5
S11 - Input R.L. (dB)	-15	-20	-17
S22 - Output R.L. (dB)	-22	-23	-17
Noise Figure (dB)	2.5	2.2	2.0
Bias	5 V at 150 mA		







NOTES:

1. All components are 0603 size unless otherwise noted. All components can be standard 5% tolerance parts.
2. The FET should be mounted as shown in the FH1 datasheet.
3. The application circuit should be biased directly into a constant voltage DC regulator. A dropping resistor is NOT required for biasing this device.
4. R1 is used to make the circuit unconditionally stable. It is not necessarily required for circuit operation.

Microwave Europe

Editor: Simon Lewis, GM4PLM

Hello and welcome to another Microwave Europe column. As the last remnants of the fine weather we have had in late Autumn in the UK disappears, to be replaced by the wet and windy conditions we are currently experiencing in the UK, I have started planning investigations into some new sites for microwave operation in GM for next year. However unless there is a dramatic improvement in the weather during the winter months, it will be next spring before I venture out to try them! 1000M ASL in GM during the winter months can be a very inhospitable place! Of course the winter brings a time to plan for new operations in the coming year and it's with this thought in mind that I would like to suggest that you think of doing something different next year. Try some new modes or perhaps active a new band? Whatever it is, now is the time to start planning, so what are you going to do next year?? On to the news for this issue. Again this has a UK flavour too it.

Come on EU – there must be something happening in your part of the world – please tell me about them! Regards Simon GM4PLM

Crawley Microwave Roundtable Report – Peter Day G3PHO

The Crawley Microwave Round Table is the "Friendly One" among the several such meetings held elsewhere in the UK each year. Held at the Crawley Amateur Radio Club in Sussex, South East England, t has a very welcoming atmosphere, more like a club meeting than what we have known at other venues. The club is well endowed with equipment and catering facilities as these photos show. Activities stretch from 136kHz to well into the microwave spectrum and includes participation in major amateur radio contests each year.

Each year the club hosts a microwave meeting and this is attended by amateurs mainly from the south and south eastern area of the country.

This year I decided to attend as, sadly, I had a van load of "Silent Key" radio gear belonging to the late G3KEU to dispose of.

Jack,G3JMB, now over 80 years of age, is a regular portable operator in the UK 10GHz Cumulative Contests. His wife Margaret often goes along and helps with the 2m antenna rotation!

Seen here are: Mike, G3LYP (seated) Jack, G3JMB (checked shirt) and Chris, G0FDZ (on right)

Chris, G0FDZ, is a beacon keeper for several microwave beacons as well as the well-known GB3VHF 144.430MHz beacon. He is a keen contest operator and makes an annual summer expedition to various parts of the UK, such as the Channel Islands and the Isle of Man to give others the opportunity of making microwave contacts with those rare locations on all bands from 1296MHz up to 24GHz.

Grant, G8UBN, brought along some of the microwave items he markets through his business G.H. Engineering. he is well known for an series of excellent solid state amplifiers for 1296MHz.

He also gave a most interesting lecture on some of the most recent microwave devices, such as

Hittite mixers, that are now available and showed the design of a 24GHz transverter using double conversion techniques with the minimum of components and only one filter!

Another lecture, on digital communications, was given by Andy Talbot, G4JNT. He was preceded by David Bowman,G0MRF, who presented the Gemini 2.4GHz downconverter, developed by himself and Sam, G4DDK.

The meeting ended with a review of UK microwave activity during the past year. Many thanks to the Crawley team. Peter G3PHO

F1DBE/p:

Field Day – French Style!

Microwave field days seem to be enjoyed in the UK as much as France. However Jean-Pierre, F1DBE, sent me some photos that show perhaps the French have a little more style when it comes to eating out field day style! Here are some nice pictures and translations courtesy of Jean Pierre and his group of friends. Makes me hungry reading it. Bon Appetite!

First the radio part! The mounting time is about 45 minutes by one OM. The longest part is the stabilizing and levelling the trailer. The mast is 7.6 meters tall with more than 2 meters in the support pipe. The antennas mount on the mast horizontally and can be made level and parallel one to the other. Everything is positioned properly with the aid of a hydraulic jack. The mast is raised with the aid of a 12 VDC air compressor feed from a socket on the trailer via the car. At the time of 24 hour + contest activity, there is a rotator for turning the antennas. The rest of the time, they are turned by hand this being more rapid but unpleasant in rain, HI!

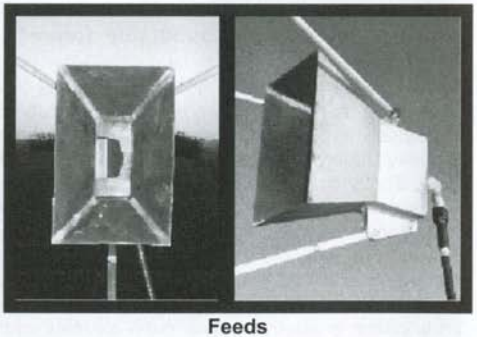
Do you work AO-40? No, I said, not yet (beyond two QSOs) but we are also working towards it. For me it is a winter project requested by Santa Claus.

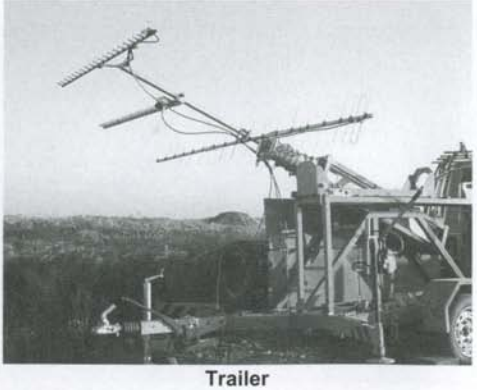
We make 2 contests in this group, the UHF in March and the IARU UHF in October. We are QRV in general with:

144 MHz 100W - 2 X 9 ele
432 MHz 100w - 2 X 21 ele
23 cm 100W (or 10 W if close)
13 cm 10 W
5,7 GHz 4 W
- offset antenna of 85cm used on 4 bands
10 GHz 8 W
24 GHz 500 mW
47 GHz / some mW.

The 23 and 13cm use a dish of 1.42 meters. The feed is dual on 23 / 13 of the type OE1PMJ (Dubus n° 2 / 86)

F1DBE/p


Feeds


Trailer

For the trailer, here are some photos of the Band of 4: F1PYR, F1PHJ, F1FEM, and F1DBE at the time of the French National VHF Contest in March 2002 where the temperature was 2 degrees C (about 35 F) with rain and wind. Installing everything per the photos requires 3 hours for each expedition and the same amount of time for dismantling the equipment by 4 guys.

F1DBE/p Contest QTH

Happily the Chef was there for fixing some good hot plates to eat, HI! The call changes each year for the person who will do the cooking.

For a little (mouthwatering) history, the menu served at contest time was:
Saturday noon....they call what follows "Auberge Espagnole" literally Spanish roadhouse which is to say that everyone arrives with his hands full of foods, kicks open the door and dumps his food items on the table. Everyone then serves themselves informally ....without forgetting that the mounting of antennas etc is is not finished though the tent is in place.

Saturday evening. I served my recipe very hot to warm the body. It was a beans and meat stew of my own creation with Toulouse sausage, slices of country lard, preserved duck accompanied with three kinds of vegetables, all topped with melted cheese and bread crumbs and a fine Bordeaux wine aged in oaken barrels. (Hunger set in about here – Ed!)
Sunday noon. Some Tagliatelles, that is, fresh pates with filet of salmon in a cream cheese sauce, a fresh fruit soaked in dry white wine (we must drive home), without forgetting the cheeses, desserts, and real coffee....and all of this worthy of a 4 star rating in the Michelin guide!
73 from Jean-Pierre, F1DBE

New UK 76 GHz Record

On the 1st of September 2002 successful two way contacts were made on 75976.2 MHz between G3PYB/P located near Ventnor, Isle of Wight and G8BKE/P and G8ACE/P located near Highclere to the west of the A34 and south west of Newbury, Berks. The distance 79.6km. Contact between G3PYB and G8ACE was on NBFM and between G3PYB and G8BKE on NBFM and CW (G8BKE). The success in making this contact, thought to be a new UK distance record for this amateur band was we think due to favourable humidity conditions prevailing on the day. Attempts during 2001 were by and large prevented by the Foot & Mouth restrictions. During earlier 2002 attempts the weather conditions were either unfavourable due to rain or excessive humidity often above 80-90%. G3PYB measured the humidity as low as 39% during these tests. The BBC web weather information gave humidity values of 58% for Ventnor and Newport IOW, 43% for Southampton and 35% for Andover and Newbury for 1400 GMT. All significantly lower values than we had experienced before. The attenuation at these frequencies is significantly affected by water vapour. Earlier experiences show that in choosing a suitable test path a K value of 1 is much more likely to lead to successful exchange of signals rather than K=1.33 Additionally at least 20 metres of clearance has been found necessary between any intervening high ground and the LOS path to avoid penetration of the fresnel zone by trees and buildings when examining possible path profiles. These constraints mean that few long paths from accessible sites in the South of England will meet the concluded criteria for successful communication at the limited transmit power levels we can obtain.

Internet News

New Microwave Reflector

A new reflector has been established for UK and EU readers to participate in. This is designed to be used along the same lines as the successful US reflectors but aimed squarely at UK and EU users. As an attempt to kick start some co-ordinated activity between UK microwavers (and close friends in EU) I thank you for your interest. The group is

http://groups.yahoo.com/group/ukmicrowaves/

Paul Wade W1GHZ has recently been updating his excellent online antenna book. well worth downloading! **http://www.w1ghz.cx**

Beacon News

GB3NWK Closed Down

GB3NWK microwave beacons, located near Orpington in Kent, are off the air. We have now been informed that the two beacons, which operated on 1296.81 and 2320.85MHz, will not be returning to service. Changes to the status of the site where the beacons are located has meant that it is no longer suitable for this purpose. Therefore, after 20 years of operation on 23-centimetres and 16 years on 13-centimetres, these beacons are now closed down permanently.

Items for inclusion in this column should be sent to:
Simon Lewis
Creoch Farm
Ochiltree
Ayrshire
KA18 2QH
Scotland, U.K.
gm4plm@emn.org.uk http://www.emn.org.uk

No 144 MHz talkback. The 3keu was arranged earlier in the week via Email. While they did attempt on 144 and 432 MHz, no signals were heard.

At EM13 the weather was 22 C and 70% humidity with the station about 170 Meters above Sea level. At EM41 it was 23 C , 88% humidity and less than 100 Meters above Sea Level. It was partly cloudy at both locations.
The signals were strongest just at dawn, an hour later the signals had faded into the noise. 10 GHz was used first, with signals about 10 dB out of the noise, after an easy QSO they QSY'ed to 24 GHz where again the signals were about 10 dB out of the noise for a second easy QSO. An attempt to repeat the QSO 12 hours later resulted in no signals being identified on 10 GHz. It is believed that the morning 24 GHz QSO was tropo enhanced although one peak may have been airplane scatter.

Millimeter Records

While I don't have anything to report at this time, it is known that several millimeter stations are upgrading to QRSS DSP processing. This is the DSP technique commonly used by VLF communicators. Look for several of the millimeter records to be greatly extended soon!

for discussion of amateur radio above 1 GHz, any mode, any style (ie terrestrial satellite EME etc) - Please be an active addition to the group and share news and information that you know of. It seems there is much going on in the UK but in isolated groups. News does not seem to penetrate everywhere and much of it gets missed. I visualise this group as spreading news, information etc around the UK (and EU as our close neighbours). This should include what's available on the second hand and surplus markets and what events are coming up, contests etc. I do notice that information on surplus items gets banded about but does not reach some parts of the UK outside the central belt! This probably goes for our EU neighbours too. Please use the group constructively and responsibly. I don't want it to turn into a soapbox, or an area for personal attacks. Lets be sensible but constructive - its not a moderated group and I am not the censor - I only set it up to try and stimulate some activity in the hope this will permeate to the bands!

The group has a database area established and I would like active microwavers who are willing to become 'elmers' to newcomers, to add their details to this area so that they can be seen as such. This is also a photo archive for your use too.

Thanks for your time and interest! Feel free to post away! 73 Simon GM4PLM

You can find details on the group at:

Microwave USA

Editor: Kent Britain, WA5VJB

New World Rainscatter Record

The big news at this time is the new world 24 GHz record between W5LUA EM13QC and WW2R/5 EM41HC September 7th. Between the 6 digit grid squares, the distance was 542.8km, between the actual points it was 542.8 km

WW2R/5 (Op G4FRE) used a .65m dish, .7m of flexible waveguide, and a Hughes TWTA running 11 watts. A 1.8 dB HEMT was mounted directly on the waveguide switch, to a homebrew transverter and a IC402 IF. Frequency was GPS calibrated. Signals were about 6 dB out of the noise

W5LUA also used a .65m foot dish mounted at 20 Meters. The dish has both azimuth and elevation control. Power was 50 watts in the shack, but only an estimated 7 watts at the dish. A 3 dB NF preamp was also located at the dish. Signals were about 10 dB out of the noise. CW signals of 549's were exchanged.

Perhaps the most interesting point of this QSO was that NO LIAISON was used! No Cell Phones.

EME News

Editors: Bernd Wilde, DL7APV
Heinz Borde, DM2BHG

Intro

Next EME conference take place in Trenton, NJ, USA in 2004.
More pictures from the EME 2002 Prague conference you can find in the Web under:
www.g0ruz.net and www.emecz.cz/ and http://homepage.mac.com/gm4jjj/index.html

ARRL-Contest

Some notes in brief
How to Get Entry Forms
Official **entry forms** and complete **rules** for ARRL contests are available electronically from several sources:
a) From the ARRL Internet Infoserver. Send an e-mail message to info@arrl.org . The subject line is ignored. Enter the following text in the body of your message:
HELP
SEND EME.FRM
QUIT
b) From the ARRL's World Wide Web home page, at http://www.arrl.org/contests/forms .
Logs no later than December 24, 2002 (30 days after the contest). Official forms are available at the ARRL Website (http://www.arrl.org/contests)
Include details of your station setup and a photo. Cabrillo format is **not** required for electronic submission in the EME Contest.
Entries **must include** the log file and a fully completed standard summary sheet. E-mail entries should be submitted to EMEcontest@arrl.org
Paper/diskette entries should be submitted to EME Contest, ARRL, 225 Main St, Newington, CT 06111.

432 MHZ

BY7BJA: Feng (by4bja@citiz.net) in China has been again in contact with WA4NJP. Ray sent him information on JT44 and received the following reply -- I changed my jobs last year. I went to a middle school to do some management work, and was away from my station. I am returning to teaching next month and will be back near my station. I will try to do something on EME, but I need to work on my system first. Thank for your information, I will ask for more details after I finish checking out my system.

DL7UDA: Dietmar has started EME activity on 432 MHz. I built up 4 x 7.5 WL 21 el yagis (DK7ZB design). I finished building up my antennas on 28 Sept and heard DJ5NV with quiet good signals, but was not quick enough to answer his CQ. On 29 Sept I made my **first 70 cm EME QSO** with DL9KR (O/449). It took not more then 10 minutes in spite of my low experience with CW. I also heard DF3RU and DJ5NV again. My station consists of an Icom 475H driving a GS35B 700 W HB PA feeding my 4 el yagi array (24 dBi) with 1 dB feedline loss and MGF 1302 DJ9BV 0.5 dB NF 16 dB gain LNA and an AF Filter (JUDSP2 using 200 Hz & Iss BW). My EME station grid-locator is JO62uu (my home is JO62TK). I should be QRV in ARRL contest and the next SWs.

HB9Q: Dan (hb9crq@hb9q.ch) reports working 4L/ZL1RS on 432 15th June at 1800. He has 4 yagis and 60 W. Dan says it was not an easy QSO, but that he completed after 20 minutes. They were only there until mid July, and focused on 144 MHz. There were no further information on this dxpedition.

K7XQ 24./25.08. Last night was great for me too. I worked G4YTL on 432 with just my 150 watts into 2 X 9.W.L. Then we moved to 144 MHz and I worked him with just Daves single M2 2M5 W.L. and 500 watts. On 144 I was using 400 watts into 4 X 3 W.L. This makes Dave the smallest station worked on both bands!! JT-44 made the experience very exciting. Jeff K7XQ

OK1DIG I have finally my 70cm EME setup running, receiveing good echoes. Now looking for my first initial. I will be QRV in the future. Rig: 630 cm dish, 1kW, 0.5 dB. 73! Dan / OK1DIG
mailto:dan@dig.skylink.cz

432 & up (net) news

[The **JT44** random CQ calling frequency has been moved to ***432.044***.

K6IBY is getting good results with 50 W on 70 cm, but still wants to make some improvements and is not yet ready for skeds.

W7UPF I am about ready to use my 70cm dish on EME but I need a power amp of at least 400 watts. Are there any tube or solid state amplifiers on the market? If so, who makes them and how can I get specs? I would appreciate your comment.
donsay2@cox.net

N8XA: still QRV 2 meters and 70cm EME.

KM5A I've completed my second EME array (4 x

21) for 432 mHz and have some new electronics purchased from Dave (K2DH). My sun noise measurements seem acceptable, but my moon noise test failed. I don't know if the moon can be detected on 432, though. I'll be carefully monitoring during the upcoming contest!
73, Steve (KM5A)

W5LUA Al picked up 2 2.6 meter dishes in Minn last week. Will use them for 24 and 47 Ghz projects.

VE4MA Barry has snow on ground in Manitoba. Will slow down sun noisetests on new offset dish on 24 and 47 ghz. Working on 24 ghz converter, cleaning out the weather induced crud.

DL1YMK is looking for activity on 23cm today. But moon position not too good. 3.8 meter dish 500w. Got the YD-1336 with help of DK1BU. No drift at 500w.

WA7CJO has taken down a 10 meter Scientific Atlanta dish and moved it to a location to put it up. Bands to be 70cm & up. **W7GNP** will be the call. 24 Ghz PA is running 100w+, has a problem with 23cm xvtr stability. 24 Ghz stuff is all in lab and just needs to clean off the dust and mount the feed.

DF8GH, Claus, likes to become active on 70 cm EME.

RA3LE new antenna 8 x 7meter RA3LE yagi

F5VHX New call for F/G8MBI & F/GOVBA.. "MBI" will change call when sent 42 Euro

K1RQG dish is completely repaired, now concentrating on building new mount for the dish.

WA6PY I am preparing for multiband operation in the contest. In October I will operate on 144, 432 and 23 cm and in November I am planning to be on 144, 432, 23cm and 13cm. On 144 I will use two yagis pointed on horizons toward Europe and on moon set JA and VK. The window will be short. On 432 I will use dual dipole / dual polarization feed and the Moon window will be longer, but I will be able to work only few big guns. I will move the position of the feed, so basically I can cove entire Moon window. VY 73 GL in the contest, Paul, WA6PY

W4JBB I have recently relocated and am interested in moving from satellites to EME - specifically, 432 EME; eventually graduating to 1296 EME. I currently have the Yaesu FT-847 and G-5400B rotor and controller. At this time, I have no amp or preamp and want to just experiment with JT44. Also I'm planning on building the K1FO 432 antennas described in the ARRL Antenna Handbook. Tnx es 73, Joel Black, **W4JBB,** w4jbb@amsat.org

W0LD Lauren in CO has 4x40 foot yagis and is working on an amp for 70cm (ex KX0O). w0ld@pcisys.net

Al, **K2UYH,** editor of the 432 & Above News Letter, reminds all that the NL is available via e-mail and the internet. You can get the NL in .pdf or .doc format from cscott@surfsouth.com (KD4LT) and also it is on the
http://www.nitehawk.com/rasmit/em70cm.html
(PA0ZN) site. As well as Back issues of the NL. Latest skeds will always be on DL4EBY web page. You can find links at the
http://www.nitehawk.com/rasmit/em70cm.html.
page through the 432 & Above
http://www.qsl.net/pa0zn/nn/k1rqg_nns.html EME NET NOTES. This is a direct link to the latest skeds. Copy and save it to your favorites.
http://www.dl4eby.de/ltskd.htm

NEW MOON ?
Well, according to a statement from the Institute of Astro Physics, University of Oslo, world physicists in the beginning (yesterday) thought it was scrap (most probably a rocket booster as Michael, W9IP pointed out). However, more accurate and up-to-date observations indicates that it could be a new moon which must have entered quite recently. It is also said that amateur astronomers should be able to see the object with a 12 inch telescope. If it is really a new moon, it is hard to believe, isn't it! Anders, LA8LF.

1296 MHz

Hi Everybody, because many questions about **septum polarization** transformer, you have on http://www.qsl.net/ok1dfc/EME/EME_soubory/sept%20feed%20calc%20angl.xls
calculation sheet.
Regards Zdenek **OK1DFC**

DL8OBU Juergen, reports: July 08, 2002
I'm qrv on 23cm with 3.10m dish and @100W HF in the feed, since about 4 weeks.
I worked in the meantime :
#06 6, 8th DJ9YW m/o sked
#07 6, 8th G4CCH 529/439 random
#08 6, 9th OZ6OL 429/429 random
#09 6, 9th DF4PV 419/429 random
#10 6, 14th K5JL 429/429 random
#11 6, 15th JA6AHB o/o(429) sked
#12 6, 15th GW3XYW 449/449 random

#13 6, 15th F1ANH o/m random
#14 6, 15th G3LTF 529/529 random
#15 6, 15th W2UHI 539/529 random
#16 6, 16th VE1ALQ o/o sked
#17 6, 17th W5LUA o/o sked
#18 6, 20th IK2MMB 529/539 sked
#19 7, 4th K2UYH 549/559 sked
#2o 7, 6th OH2DG 439/439 sked
#21 7, 7th SM3AKW o/o sked
#22 7, 11th WA6PY m/o sked
#23 7,11th HB9BBD 529/559 random
#24 7,13th JA6CZD 439/439 sked
#25 7,13th HB9Q o/559 random
#26 7,14th LX1DB 449/569 random
#27 7,14th SM6CKU o/o random
#28 7,14th N2IQ 549/559 random
#29 7,14th KA0Y 559/549 random
I just modified the roof of my house (two tiles had to go) , so I have no problem to touch the roof with my dish anymore. Now I can operate with elevation from 20-60 deg in the full azimut range from 90 - 270 deg. 432: I'm also still qrv 70cm EME. Who did not work me there? Who wants to try with me? (here : 4x33ly + YL1500) I plan to **put down the 70cm** EME- Rig next spring. So I will not be QRV on 70cm EME later on. Mail to: juergen.kaufer@t-online.de. My homepage at http://www.qsl.net/dl8obu/index.html
73 de Juergen, DL8OBU

F6ETI reports EME activity:
13/07: G4CCH 539/539, F2TU 51/31
14/07: F2TU 549/539, OE9ERC 559/559, ON5RR O/O, W2UHI 539/539, OH2DG 539/529
10/08: F1ANH 539/319, OZ6OL 519/529, ZS6AXT 519/559, W2UHI 539/549
11/08: G4CCH 529/529.
73 de F6ETI, Philippe, f6eti@wanadoo.fr

13cm

WA6PY: I switched feed to 13 cm and on Sept 28 QSO'd in skeds OK1CA and HB9SV, NIL from G3LTF, next day QSOd G3LTF. I have some problems with my 13 cm PA with YD1381, power suddenly jumps down by 3 dB and I have to retune cavity. I could not perform any deeper test during skeds. On 2320 I have increased noise floor versus 2304. Then I switched on 2424 receiver and found that the band is covered by very strong wide spread modulated signals. It looks like Bluetooth or 802.11b, but at the moment. I can not borrow a spectrum analyzer in order to check what it is. I am using my 15 years old LNA with very high gain close to 60 dB in order to overcome cable loss and high NF of the converters and loss in splitters and band pass filters.
Consequently the input IP3 of my RX system is very low. 15 years ago it was no need for high IM performance, but it looks like now it is a must on 13 cm.

VE4MA back from conference. Conclusions from the conference: a lot of discussion about operating procedures, circular polarization above 13cm agreed on. OK1DFC has developed a program to design a means of circular polarization (Septum polarizer) will replace tuning screws being used, by OK1KIR, JT44 discussion ensued as well, Great conference. More info on polarizer to come. Next 24 Ghz operation will be after the contest weekend, but more. discussion needed, OK1KIR station was flooded out and will be QRT and needs a lot of cleanup..

ES5PC / SM0WCM A few days ago I have completed my very first three skeds on 2304MHz:
05./06. Aug 2002:
SM3AKW, F2TU and W5LUA.
It seems that my signal was copied quite well by all of these stations but for me they were still quite weak, especially SM3AKW. It took two attempts before I finally completed the qso with AKW. My moon window is limited between 170 and 260 degrees but at lower declination of the moon it ends earlier due to some treetops. I can TX/RX on both 2304 or 2320MHz. 2.6m dish, polar mount, linear pol., TX: 400W-0.8dB TX cable loss, RX NF about 1dB. I can copy my own echoes most of the time. Sked proposals are welcome! Next time I will probaly be qrv in one of the ARRL EME contest weekends this autumn. Hopefully I will have a feed with circular polarisation and a better preamp then.
73, ES5PC / SM0WCM

10 GHz

DJ5MN After several years being active on 2m-, 70cm- and 23cm-EME, I now try to make the next step: EME on 3cm. When I started this project 2 years ago I was an absolute greenhorn to 10 GHz knowing nothing. Now it looks like I have all equipment running OK on 3cm and I like to try 3cm-EME in the ARRL EME contest from my new own house. Details of my small 3cm-station:
More than 100 watt at feed (vertical polarization) Is this OK?? 1.5 m parabolic dish (f/D 0.407, gain 42.4 dBi), manually turned in azimuth and elevation (visible moon) (dish has limited window), preamp less than 0.6 dB NF. RX: I believe in my ears so no computer analyzing. Due to bad weather I still have not echo tested. Now I am looking for those 10GHz-EME-freaks who are interested in trying with me in the contest and like to arrange a sked. What about you? For skeds please drop me an email. I am also interested in the kind of equipment you are using for 10GHz-EME and any kind of hints for 3cm-EME! Please always send emails

emails to both of my addresses:
dj5mn@web.de and dj5mn@9a0tcp.ampr.org
GOOD LUCK IN THE CONTEST TO YOU
73 de Bernhard

Expeditions

3B8/ON4AME

I would like to repeat the question. How much interest is there in 3B8 on EME? So far I've made a TS2000 available for ON4AME, it covers 2m (100w) 70cm (50w) 23cm (10w) I've collected following antennas: 2m 2x9el (1.5wl), 70cm 2x19el 23cm none. I don't think that with this power and antennas he will be able to work a lot of stations on 2 or 70. He has the possibility to have antennas shipped to 3B8 and have them collected by a belgian friend that lives there. (this has to be done in December) He has no plans in bringing back the antennas, so the will remain in 3B8, problably leave them for 3B8CZ. So if someone is willing to help out let me know, time is short. In case you wonder, yes there will be experienced VHF ops in his crew. Johan, ON4ANT on4ant@pandora.be (ON4ANT)

LinRAD

There is a Linrad mailing list now. If you have an interest in my SDR (software defined radio) you can subscribe to the linrad list by sending a mail to majordomo@antennspecialisten.se
The first line in the body of the mail has to be: subscribe linrad. Postings for the list should be sent to linrad@antennspecialisten.se, 73 Leif / SM5BSZ

SETI

Information about the **SETI 23cm beacon** can be found on the SETI-League website:
http://www.setileague.org/eme/index.html
http://www.setileague.org/eme/emespecs.htm
The beacon operates on 1296.000 MHz, +/- 2 Hz.
Antenna is a quad helix array, G = 24 dBic, RHCP.
Photo: http://www.qsl.net/w2eti/
Transmit output ~150w; EIRP ~ 74 dBm.
Est. signal level as received on Earth (not including your antenna gain) ~-197.2 dBm.
The SETI League's moonbounce beacon operates whenever our Moon is above the horizon at the station location.
It transmits in a five minute repeating cycle, beginning exactly on the hour [All times synchronized to GPS (-0 +1 sec.)]:
- Key down, full power, for one minute
- 5 WPM CW identifier, W2ETI (two callsign cycles), for approx. 30 seconds - Key up, for approx. 3 1/2 minutes
- Repeats every five minutes
Location: Kinnelon NJ USA, Grid Square FN21ta
Anyone detecting the W2ETI beacon is encouraged to apply for your Extra-Terrestrial QSL Card:
http://www.setileague.org/awards/qslcard.htm
73, Ed AL7EB
SETI-League coord for Alaska
Argus Station: BP40iq - 1420 MHz/2.4m dish

Amateur Radio Astronomers Team Up With Alien Hunters

Green Bank, WV.., July 2002
The SETI League, Inc., non-profit leaders in a privatized Search for Extra-Terrestrial Intelligence (SETI), announces its affiliation with the Society of Amateur Radio Astronomers (SARA), the world's leading advocate for amateur radio astronomy research. Plans were formalized at the annual SARA Conference at the National Radio Astronomy Observatory (NRAO) for each of the two organizations to join the other as a Member Society.
The two amateur groups have distinct but complementary missions. Founded in 1981, SARA (on the web at www.qsl.net/SARA) focuses on developing technology to study natural astrophysical phenomena. The SETI League was organized in 1993 to help privatize the scientific search for technological civilizations in the cosmos. The two organizations have a substantial number of members in common.
SETI scientists seek to determine through microwave and optical measurements whether humankind is alone in the universe. Since Congress terminated NASA's SETI funding in 1993, The SETI League and other scientific groups have been attempting to privatize the research. Experimenters interested in participating in the search for intelligent alien life, or citizens wishing to help support it, should email to join@setileague.org, check the SETI League Web site at www.setileague.org

Treasury INTERNET

Swedish email addresses form OMs you find at: www.svessa.se/e_postkatalog/ SM-Calls emails

I've been really busy, but I've got a newer version of **the visual signal detection system** available. You can find it on my web site
http://members.cox.net/settingstarstudio/

For those who is looking for **ufb preamps**!
P-hemts for 2m and 70 cm, look at www.anglelinear.com. Measured 3 of them with the latest HP/Agilent with extraordinary result, between 0,079-0,124 db Nf! At same time measured the Mimec? It couldn't beat "Chips"preamps. The

amateurcost is around 110-120$ each so there is some $ to save. Chris SM5IOT
(sure abt. measuring ?? APV)

W5UN's **CWkey**5 programm at:
http://www.dxsoft.com/en/products/cwget/

New EME Echo Mode included at WSJT

(from Joe Taylor, K1JT)

WSJT Version 2.3.0

This release of WSJT is the first to include the EME Echo mode. This mode allows you to detect and measure your own lunar echoes, even if they are far too weak to hear. The mode can be highly useful for evaluating your station performance, even if you prefer to use CW rather than JT44 for your EME QSOs.

You can download the upgrade from the WSJT home page, http://pulsar.princeton.edu/~joe/K1JT, and soon also from the European mirror site http://www.qsl.net/dk5ya. To upgrade an existing WSJT installation of Version 1.9.4 or later you should download and execute the file UPD230.EXE, which will replace your existing files WSJT.EXE and WSJT1.DLL with new files of the same name.

I have not yet produced a new full distribution of the latest version. Doing this will require extensions to the User's Guide and Reference Manual, and will probably be accompanied by further improvements to the program. If you wish to do a full installation of Version 2.3.0 from scratch you should download the installation file WSJT222.EXE, run it to install Version 2.2.2, and then upgrade to Version 2.3.0 as described above.

EME Echo mode is presently a plain, no-frills implementation. You can activate it from the Mode menu or by striking function key F9. Most of the familiar WSJT buttons will then disappear from the screen, leaving just a few that are essential for controlling the Echo mode. If your station is already operational in the FSK441 and JT44 modes and you have provided the proper signal levels, all you need to do for an echo test is to start WSJT Version 2.3.0, hit F9 to switch to EME Echo mode, aim your antenna at the moon, pick a clear frequency, and toggle Auto Period On. The program will then start cycling through the following loop:

1. Transmit a fixed tone for 2.0 s
2. Wait about 0.5 s for the start of your echo
3. Record the received signal for 2.0 s
4. Analyze and plot the results
5. Repeat from step 1

The loop cycle time is 6 seconds, so the transmitter duty cycle is only 2/6 or 33%. Your transmitter will think it is loafing. At the start of each transmission the frequency of the transmitted tone is randomly dithered by an offset up to +/- 100 Hz around a nominal value of 1500 Hz. The programmed offset is removed from the computed spectrum of each recording before it added to the accumulating average. This procedure helps to minimize the effect of birdies in the receiver passband: in the average spectrum a fixed-frequency birdie will be smeared out over a 200 Hz range, while the desired signal remains sharply defined.

Two curves are plotted in WSJT's main plot area during each pass through the Tx/Rx loop. Each represents the spectrum of received power over a 400 Hz range centered on the expected echo. The curve in gray is a reference spectrum that you can use to be sure you have chosen a reasonably birdie-free passband. It is aligned so as to remove the EME doppler shift computed at the start of your run. The alignment will not be subsequently adjusted for changes in doppler shift or for the random dithering of the transmitted frequency.

Stable birdies will therefore stay fixed in the blue spectrum, making them easy to recognize and evade if necessary. The red curve displays the desired EME echo signal. Spectra computed for each 2-second receive period are shifted to correct for changing doppler shift and for the programmed frequency dithering, and are then averaged. The EME echo should apprear as a narrow spike near the middle of the red curve, close to DF = 0.

In addition to the graphical display, a line is presented in the WSJT text window in the following form: N: 16 Sig: -26.3 dB DF: -1.3 Hz Width: 0.7 Hz Q: 9

This information gives the number N of Tx/Rx cycles that have been averaged, the mean signal strength in dB, the measured frequency offset of the detected echo from the expected frequency, the spectral width of the echo, and a relative quality indicator for the detection on a 0 - 10 scale. Signal strength is measured in the same units as used in the FSK441 and JT44 modes, i.e., in dB relative to the received noise power in a 2500 Hz bandwidth. Low values of Q represent dubious detections, in which case the values of signal strength, DF, and width may be meaningless.

A note about doppler calculations will be helpful here. Most computer programs in amateur EME stations use approximate formulae to compute the position and distance of the moon and the expected doppler shifts of echos. WSJT is no exception, and I cannot presently quote a firm figure on the accuracy of its doppler calculations or de-

scribe how their errors depend on lunar coordinates or the accuracy of your station location. EME Echo mode uses a calculated doppler shift to align received spectra so that the echo should appear at DF = 0. In my brief experience using the Echo mode on 2 meters I have found that the return signals fall very close to DF = 0 when the moon is setting, but around -20 Hz at moon rise. I have not yet determined the source(s) of this error, but in due course I will track them down and if necessary install a more accurate lunar ephemeris routine.

If you can hear your own EME echoes you should see a spike in the red curve within a few seconds after toggling Auto Perion On. If your echoes are 10-15 dB below the audible threshold you should see a significant spike on the red curve within a few minutes. To give you a better example of what to expect, consider the parameters of my station. On 2 meters I run up to 400 Watts to a 17.6 dBd antenna (4 x 9 el yagis) aimed at the horizon. I have never heard my own CW echoes with this system. However, when the moon is in my elevation window at 0 - 10 degrees I can easily detect my echoes at any time of the month using WSJT in its EME Echo mode. Indeed, I can turn off the PA and use my FT-847 barefoot, delivering 35 W to the antenna, and still detect my echoes rather easily, even with the moon in a "bad" part of the sky and the path degradation as large as -8 dB. I seem to be able to detect my echoes reliably down to relative signal levels around –36 dB.

The spectral analysis done in EME Echo mode provides a frequency resolution of 0.67 Hz. If your transmitter or receiver has short-term frequency stability much worse than this value, so that something drifts or wobbles by more than about 1 Hz in 2 seconds, your echo sensitivity will be degraded. Most modern radios have no difficulty in meeting this standard on the 6 and 2 meter bands, but the higher UHF and microwave bands will be more problematic. I don't have enough experience to know what the spectral width of an echo on the 432 MHz or 1296 MHz band should be after averaging for a few minutes. I have been measuring widths of 2 Hz or less on 2 meters.

By default WSJT will assume that your receiver and transmitter are tuned to the same frequency. An on-screen box labeled "RIT (Hz)" is provided so that you can inform the program of any offset receiver tuning, for example to accommodate a large doppler shift. Suppose you are running a test on 70 cm and the predicted doppler shift at the start of the run is -1087 Hz. That would cause echoes from the 1400 - 1600 Hz transmitted audio tone to come back as low as 313 Hz, probably well below the low-frequency cutoff in your receiver's passband. Use your transceiver's RIT control to offset the receiver tuning by some round number within a few hundred Hz of the predicted value – say -1000 Hz in this example -- and enter this offset in the RIT box before starting the echo measurement. The program will accommodate subsequent changes in the doppler shift up to 800 Hz or so, if necessary, without any further adjustments. Your echo should appear at the center of the red curve, as usual. You won't need to use the RIT feature on 6 or 2 meters, where doppler shifts are much smaller and echoes always fall well within the receiver's SSB passband.

Please note that I have so far tested the EME Echo mode only on 2 meters. You will discover that the software implementation is not yet highly polished; a number of improvements are already in the works, but I want to gain the advantage of feedback from other users before I go too much further. If you use the EME Echo mode -- especially on bands other than 2 meters -- please send me your comments, experiences, and suggestions! I am anxious to know how well it works for you. 73, Joe, K1JT

Silent Key

I'm regretful to announce the death of Luigi Zorzino, **I2COR**. He was active on 23 cm and 70 cm. with his homebuilt 10 m dish for many years. Despite some heart troubles, which created a heart disease, Luigi disappointed his illness because he could not stand back his antenna and shack. In June 2000 Luigi, for his heart problem, moved his dish and EME equipment to a new location to allow other OM to use it. Thanks to Luigi a new EME multi-operator Team was formed by: IK4UQT, I2TFI, IK2TLA, I2YID and I2COR, of course. He was a great italian EMEr, great homebulider, always disposable to help others. We hope for a better world for him, joined together the ranks of silent keys. Alessandro, IK5WJD

LAST

My deadline, was 13th of Oct.
Toplist will be published next time
73 Bernd DL7APV

As agreed at the: EME conference 2002 in Praha

EME Operating Guide for 432MHz and Above

Notes

This 2002 version replaces the previous 'Sked Procedures' last published in 1992. It has been rewritten as an 'Operating Guide' with more advice and background information for beginners, and a stronger focus on random QSOs. There are very few changes to the existing Sked Procedures.

1. Why?

EME signals are often weak and fading, so we cannot always hear each other. To help us to make more QSOs, we need some agreed operating procedures.

2. Minimum QSO

The definition of a minimum valid QSO is that **both** stations have copied **all** of the following:

1. Both callsigns from the other station
2. Signal report from the other station **(or** some other previously unknown piece of information, e.g. the other station's Locator grid)
3. **R** from the other station, to acknowledge complete copy of 1 and 2.

This has been the standard definition of a minimum EME QSO for many years.

3. CW speeds

The recommended sending speed on 432 MHz and above is a **letter** speed of 15-20 words/minute, but with extra space between letters so the **word** speed is only 12-15 words/minute. This helps to prevent individual letters of Morse code being broken up by rapid libration fading. Leave clear pauses between letters, and also between words or callsigns. Do not change speed. **Do not send very slowly** – it is harder to copy! These recommendations are what most people find effective.

4. Signal Reports

This section is divided into **Valid reports for a QSO** and **Other signals**.

4.1 Valid reports for a QSO

On EME, do not send a signal report until you have copied **both** callsigns **completely**!

Valid signal reports for a QSO on 432MHz and above are:

M Very weak, marginal copy but **both callsigns complete (M** is valid for a QSO on 432MHz and above)

O Weak, but **both callsigns complete**

Leave clear pauses between letters, so there is no possibility of mistaking **M** and O.

RST – not the same as on HF. Typical EME RST reports include:

339 Stronger than O but still quite weak and difficult copy

449 Stronger than 339, almost complete copy

559 Very strong (for an EME signal), complete copy.

Other combinations are of course possible, for example:

549 Complete copy but not "S5"

349 "S4" but difficult to copy

etc...

Remember that **RST** is more difficult to copy than **M** or O, so using **RST** can be a risk in skeds and initial QSOs. Some stations do not like to use **RST** in contests because it takes more time.

4.2 Other signals

T Receiving something, but no complete callsigns. Note that a **T** report is not valid for a QSO – it is only used to help keep a sked going. The **T** report is not often used, because with very weak signals there is a risk that the other station will copy it as **M** or O, and then the QSO will fail.

QRZ, **YYY** etc – procedural signals for random QSOs, more useful than **T** (see $$$ below).

5. Skeds

5.1 Skeds co-ordination service

Most beginners start with skeds, and there is a highly effective world-wide skeds co-ordination service to arrange skeds for people who want to work new stations. If you want skeds, contact one of the skeds co-ordinators via the 14.345MHz EME Net or at the e-mail addresses at the top of every Newsletter. Skeds are usually arranged on the monthly Skeds Weekends published in the Newsletter. **Please be sure to send your sked requests no later than 3 weeks before the next Skeds Weeken**d.

You can of course arrange your own skeds, but do not use frequencies on or below 432.070MHz and 1296.070MHz. Reason: these frequencies are used for co-ordinated skeds, and there may be extra skeds that are not in the Newsletter.

5.2 Frequency

The first-named station in the skeds list transmits first, exactly on the agreed frequency for the sked. The second-named station also transmits exactly on the agreed frequency for the sked.

5.3 Time periods

Time periods are used for skeds, because the other station may not be copying at the end of a transmission, and may not know when to change over. For skeds on 432MHz and above, time peri-

ods are **2.5** minutes for each transmission, **synchronized to UTC** (+/- 2 sec maximum error).

5.4 Example sked QSO

Skeds list says:
432.045
2300 DL9KR K2UYH
DL9KR sets his TX frequency to exactly 432.045 (using an accurate external frequency counter, not the frequency display on the rig). K2UYH does the same.

Initial transmission

Precisely at 2300:00UTC, DL9KR starts to transmit:
K2UYH DE DL9KR (pause) **K2UYH DE DL9KR K2UYH**...
This continues until 2302:30 ... **DE DL9KR** K.

Further transmissions – procedure depends on what has been copied.

Copied nothing at all

First 2 minutes – transmit both callsigns.
Last 30 seconds – do **not** transmit!

Copied something, but not copied both callsigns complete

First 2 minutes – transmit both callsigns.
Last 30 seconds – optionally transmit **T T T** – but note the warning in Section 4.2!

Copied both callsigns COMPLETE, but no report

First 2 minutes – transmit both callsigns.
Last 30 seconds – transmit report: **M M M** = difficult copy, or **O O O** = easier copy.
Do not change report during a sked period.
Do not mix report with callsigns.
Do not use RST reports in initial skeds, unless you are very confident about signal strengths in both directions.

Copied both callsigns + report

Full 2.5 minutes - transmit only **MRMR** or **ORORR**

Copied both callsigns + report + R confirmation

Full 2.5 minutes - transmit only **R R R.**

Copied R

If you have copied one **R** from the **R R** R... transmission, **the QSO is now complete**.
To confirm this to the other station, it is usual to transmit **R R R, 73 TNX GL SK** etc.

5.5 Incomplete sked QSOs

Co-ordinated skeds are of 30 minutes duration. If the QSO is incomplete at the end of the 30-minute sked period, you should generally abandon the sked – someone else will probably need the frequency. 'Private' skeds may continue longer, but should not be on frequencies used for co-ordinated skeds.

6. Random QSOs

Most QSOs on 432MHz and 1296MHz are 'random' – not by skeds. Usually there are no fixed time periods because both stations can hear when to change from RX to TX. The basic format for a random QSO is the same as for a sked, except that one station has either called CQ, or has signed out of a previous QSO on 'his' frequency.

Example

K1RQG has called CQ. **DL4EBY** is going to call him for a random QSO.

6.1 Calling a station

Frequency

Set your RX clarifier (RIT) so that your echoes are at the same audio pitch as K1RQG's signal. Then he will hear you on exactly the same frequency as *his* own echoes. You may not want to call exactly on that echo frequency, because it may be the center of a pile-up!
If you cannot hear your own echos, calculate your echo offset using software such as VK3UM, Nova etc, and set your clarifier to that. Take care to set the offset in the correct direction – HF for rising moon, LF for setting moon.

Sending callsigns

Send **both** callsigns – remember that **both** stations **must** copy **both** callsigns for a valid QSO. However, it may be useful to give more repeats of your own callsign to help K1RQG to identify it, e.g:
K1RQG DE DL4EBY DL4EBY K1RQG DE DL4EBY DL4EBY...
The optimum format and length of the call is a matter of operating skill and judgement.

6.2 Answering a call

If you copy both callsigns –

You already know that the other station has copied your callsign. Your answer must make sure that he copies **his** own callsign from **yo**u. Reply with both callsigns, with extra repeats of the calling station, e.g:
DL4EBY DL4EBY DE K1RQG DL4EBY DL4EBY DE K1RQG...
Then send a report. The rest of the QSO continues as described in the sked example above.

If you have not copied either callsign for sure –

Transmit **QRZ? QRZ? QRZ? DE K1RQ**G... several times. DL4EBY should reply with both callsigns, for **1 minute or mor**e. If K1RQG replies with **QRZ?** again, call him for even longer!
Note to other stations: **QRZ? is NOT an invitation to break in!**

If you have copied your own callsign –

Often you copy your own callsign easily, but have difficulty in identifying the unknown callsign. You have two choices:
a) Call **QRZ?** as above.

b) Send **Y Y Y Y Y Y Y DE K1RQ**G...
Y Y Y means "I need Your callsign only. I have already copied my own callsign."
DL4EBY should reply with his own callsign **onl**y, for **1 minute or more**. After a second **Y Y** Y, call for even longer!
Y Y Y is very effective, but it needs more use and more publicity!

Sending your own callsign

Only you can decide the most effective way to send your own callsign, when responding to **Y Y** Y. Most people simply transmit their callsigns many times, for example:
GM4JJJ GM4JJJ GM4JJJ GM4JJJ GM4JJJ...
This is the pattern that most people will expect to hear, and will be listening for. An alternative pattern is to repeat each letter 5 times, for example:
OOOOO KKKKK 11111 DDDDD FFFFF CCCCC
This may be effective for some callsigns... but clearly not for GM4JJJ!

7. ARRL VHF/UHF contest procedure

Some stations in the USA operate EME during ARRL VHF/UHF contests. These use large grid squares (e.g. FN32) as multipliers, but do not require exchange of a signal report. On EME, the procedure is the same as described above, but send your grid square instead of the report.
G G G means "I need your grid square for ARRL contest."

8. Polarization switching / rotation

The EME Directory lists stations with linear rotatable (rot.) and linear switchable (h/v) polarisation capability. If only one station can change polarization, he should optimize polarizations in both periods, and should transmit second in skeds. If both stations can change polarization, both stations should transmit horizontal and switch/rotate to receive.

9. Breaking the rules!

For a newcomer, it often seems that people do not use the procedures described here – but this is only partly true.
Stations who have worked each other many times, and have strong signals, may decide to have a more 'normal' amateur radio QSO without using these special EME procedures. Even so, the basic QSO format is still there as a framework .
If signals become difficult to read, good EME operators should move back toward the standard procedures:

Reduce high speeds, send more clearly

Use **M/O** reports instead of RST

Do not change frequency or TX polarization

Change back to standard TX/RX periods synchronized to UTC.
Please send any comments and corrections to:
g3sek@ifwtech.co.uk

This guide is written for beginners. As well as the old sked procedures,
it includes lots of new information and advice on how to make random
QSOs, how to answer a CQ, what to do when someone answers *your* CQ...

This is our "Welcome" document to new EME operators on 432MHz and above.
We now need to publicize it as widely as possible! If you have an
EME-related web site, please include the above link.

Although the document has been open for consultation for two years,
we're still happy to receive comments and suggestions (here on MOON-NET,
or by e-mail to G3SEK).

The 2002 Prague EME Conference

The OK-group did a terrific job organizing the conference, which came off without any real hitches despite concerns over flooding. We arrived in Europe to news of the disastrous floods. Fortunately the conference site was located on high ground far from the flooding. By the conference start, the water had receded to the point where it was possible to walk along the river's banks. Nevertheless many of the tourist sights near the river were closed as well as the main train station. This latter closing caused travel complications for a few attendees, but the resourceful Czech organizers had worked around solutions.

OK1KIR with flood

More than 100 EMEers (plus 80 spouses) attended from 5 continents (26 DXCC) were represented, except S. America.
On Friday (Aug. 16th 2002) we made a tour through the fantastic Prague castle and parts of the historic upper city.
Saturday (Aug. 17th 2002):

Lectures were presented from:

Josef Dobes
NF optimalization using CAD Software

G8MBI
Antenna Tracking Systems for EME

OK1DFC
Circular Polarization (septum polarizer)

SM5BSZ
Linrad

K1JT
JT44 a digital mode for amateur weak-signal communication

N6TX
2001 a moonbounce odyssey

W5LUA/VE4MA
24GHz EME conquered 47GHz EME the next frontier

VK3UM
RF Radiation Safety

K2UYH
Stress Dishes revisited

S57UUU
A simple TWT Tester

G3LTF
Different frequency allocations in the 13cm band

G3SEK
EME operating Procedures for 432MHz and above

OK1DFC presenting his lecture

A major topic of the conference was the new digital modes starting to be used on 70 cm and above EME. Both Joe, K1JT, and Leif, SM5BSZ, gave presentations. Leif has developed computer processing techniques that allow the copy of normal CW at signal levels lower than with the ear. His approach can be considered the creation of a "super audio filter". He also advocates simultaneous reception of vertical and horizontal polarization separately and recombining them to produce the optimum polarization. This approach is applicable to 144 and 432 where linear polarization is used and Faraday rotation is a problem. It is not clear if there would be any advantage on 1296 where circular polarization is almost universally used. K1JT announced a new version of his JT44 software to be available shortly with an echo test mode.

VE4MA's talk on how EME was achieved on 24 GHz and current efforts on 47 GHz received a standing ovation.

Auditorium

Among the recommendations of the conference was the use of circular polarization on the EME microwave bands (including 3 cm). There was also considerable discussion on how to get operation on the different 13 cm sub-bands required around the world. Peter, G3LTF discussed the benefits of using a common LO in order to maintain a fixed offset in each segment. It was agreed to use CQX when listening for stations in a different sub-band.

Sunday morning we visited the technical museum. After that round table discussions were the focus. Some of the most intense discussions centered on JT44. Many stations felt that JT44 QSOs should not count for DXCC, WAS, initial counts, etc. Ian, G3SEK pointed out that the rules for awards as DXCC and WAS are set by the organization and do not differentiate by mode. I noted that the key issue is what constitutes a QSO. JT44 contacts do not appear to violate the definition of a QSO, and can occur in less time than a typical weak signal CW contact, so time delay is no factor. It was agreed that the recommended JT44 CQ calling frequency be 432.044 and 1296.044, not on .024 as proposed in last month NL.

Later in the hotel`s dinner room

(The **notes of the discussion** on 'Digital' EME modes at the Prague EME Conference are now on the Conference web site, at: http://www.emecz.cz/convent/digital%20eme%20communication.pdf)

It was also decided that the 2004 EME Conference will return to New Jersey after 14 years. N2UO will head the committee and planning has started to make the 2004 conference one that no one will want to miss.
All in all to see all the guys again and have eyeball qso´s was one of the most important reason to join this event.
(parts of the text from EME-NL, tnx Al).
DL7APV, Bernd

left: SM5BSZ, Leif, presenting LINRAD

EME 2002 Conference NF Contest Results

Order	Preamplifier	Description	N.F. [dB]	Gain [dB]	Adapters
	144 MHz				
1	**SM5BSZ**	ATF33143	**0,45**	**25,6**	BNCma/ Nfe//BNCma/Nfe
2	DL1EJA		**0,66**	**21,7**	7/16ma/Nfe//no adapt.
3	DJ7LH	LNA 145 SSB Electr.	**1,10**	**10,8**	SMAma/Nfe//SMAma/Nfe
	432 MHz				
1	**DL9KR**	MGF4919G 2stg.	**0,31**	**54,6**	N-Nfe//BNCma/Nfe
2	ZS6AXT	ATF101	**0,60**	**25,0**	N-Nfe//no adapt.
3	ON5OF -1	MGF1303, stripline	**0,63**	**21,9**	no adapters
4	ON5OF -3	MGF1303, LC	**1,03**	**16,7**	no adapters
5	EA3DXU	MGF1302 2stages	**1,67**	**50**	N-Nfe//BNCma/Nfe
6	ON5OF -2		**4,53**	**7,9**	no adapters
	1296 MHz				
1	**K5JL**	Hemt ?	**0,37**	**18,0**	SMAma/Nfe//SMAma/Nfe
2	OE5JFL	Hemt ?	**0,42**	**17,6**	N-Nfe//no adapt.
3	OK1DFC	FHX35LG	**0,45**	**18,8**	N-Nfe//no adapt.
3	HB9BBD -2	NE32484+ATE36077	**0,45**	**40,6**	SMAma/Nfe//SMAma/Nfe
5	HB9BBD -1red	NE32484+ATE36077	**0,45**	**43,3**	SMAma/Nfe//SMAma/Nfe
6	G3LTF	FHX35LG	**0,50**	**39,7**	SMAfe/Nfe//SMAma/Nfe
7	VK2DND	DEM 23ULNA	**0,53**	**18,5**	no adapters
8	ZS6AXT	FHX35LG 2stgs.	**0,54**	**26,0**	N-Nfe//no adapt.
9	DL4MEA	ATF35076	**0,66**	**15,7**	SMAfe/Nfe//no adapt.
10	ON5OF	HEMT? (DJ9BV des.)	**1,30**	**9,1**	no adapters
11	DL4MUP		**1,30**	**14,5**	SMAfe/Nfe//no adapt.
12	OH2AXH		**N/A**	**N/A**	N-Nfe//no adaper
	measured by	OK1CA	OK2AQK		

Order	Preamplifier	Description	Amplifier N.F. [dB]	Amplifier Gain [dB]	Adapters
	2304/2424 MHz				
1	**JI5MFZ 10301**	HEMT ?	**0,55**	**14,4**	SMAma/Nfe//SMAma/Nma
2	JI5MFZ 10401	HEMT ?	**0,58**	**15,4**	SMAma/Nfe//SMAma/Nma
3	G3LTF	ATF36077	**0,59**	**19,2**	SMAfe/Nfe//SMAma/Nma
4	ZS6AXT	NE424	**0,88**	**37,5**	N-Nfe//N-Nma
	3400 MHz				
1	**OH2AUE**	NEC 32584	**0,75**	**31,4**	no a-dapt//SMAmasemiridSMAma
	5760 MHz				
1	**ZS6AXT**	HEMT ?	**0,96**	**13,3**	Nfe/SMAma//SMAma/Nma
2	JA4BLC	NE32984D	**0,98**	**14,2**	Nfe/SMAfe//SMAma/Nma
3	OH2AXH	NEC 32584	**1,60**	**31,9**	Nfe/SMAma//SMAma/Nma
	10368 MHz				
	DB6NT (tombola)	MKU102A EME not in contest	**0,77**	**22,5**	Nfe/R100//SMA-SMAma
1	**JI5MFZ nr.504**	NE334S01(KH6CP des.)	**0,79**	**10,5**	Nfe/SMAma//SMA-SMAma
2	SM0ERR	MKU101A	**0,88**	**11,4**	Nfe/SMAfe//SMA-SMAma
3	JA4BLC #2	NE32984D (G3WDG des.)	**0,91**	**14,8**	Nfe/SMAfe//SMA-SMAma
4	F5HRY	NE329 (KH6CP design)	**0,93**	**11,5**	Nfe/SMAma//SMA-SMAma
5	JA4BLC #1	NE32984D (G3WDG des.)	**0,98**	**13,0**	Nfe/SMAfe//SMA-SMAma
6	JI5MFZ nr. 601	NE334S01(KH6CP des.)	**1,16**	**19,5**	Nfe/SMAma//SMA-SMAma
7	ZS6AXT	NE325	**1,77**	**11,9**	Nfe/SMAma//SMA-SMAma

Lunar Weekend Calendar for 2003

by G3SEK

At 2400 Sat/ 0000 Sun	Declination (deg)	Signals (dB)	Sun offset (deg)	Sky temp (K,432MHz)	Comments
4 / 5 Jan	-21.9	-0.2	+27	24	Moon in south.
11 / 12 Jan	11.3	-0.9	+106	24	Day(PM).Apogee.
18 / 19 Jan	**23.1**	**0.2**	**-172**	**14**	**Night.**
25 / 26 Jan	-14.1	0.9	-82	26	Moon in south.
1 / 2 Feb	-19.6	-0.3	+8	20	Moon in south.
8 / 9 Feb	14.5	-0.9	+85	24	Day(PM).Apogee.
15 / 16 Feb	**21.1**	**0.3**	**+166**	**12**	**Night. 23cm ssb ??**
22 / 23 Feb	-18.2	0.9	-99	29	Moon in south.
1 / 2 Mar	-16.8	-0.4	-14	17	Moon in south.
8 / 9 Mar	17.6	-0.9	+65	24	Day(PM).Apogee.
15 / 16 Mar	**18.9**	**0.4**	**+147**	**13**	**Night REF/DUBUS I**
22 / 23 Mar	-21.4	0.9	-117	66	Moon in south.
29 / 30 Mar	-13.5	-0.5	-32	17	Moon in south.
5 / 6 Apr	20.5	-0.8	+45	24	Day(PM).Apogee.
12 / 13 Apr	**16.3**	**0.4**	**+127**	**14**	**Night.REF/DUBUS II**
19 / 20 Apr	-23.8	0.8	-135	66	Moon in south.
26 / 27 Apr	-9.8	-0.5	-50	19	Moon in south.
3 / 4 May	22.9	-0.8	+27	29	Sun noise.
10 / 11 May	**13.1**	**0.5**	**+109**	**14**	**Day(PM). ARI CONTEST !**
17 / 18 May	-25.3	0.8	-154	166	Moon in south.
24 / 25 May	-6.0	-0.6	-68	19	Moon in south.
0 / 1 Jun	24.8	-0.7	+9	35	Sun noise.
7 / 8 Jun	**9.0**	**0.6**	**+92**	**15**	**Day(PM).**
14 / 15 Jun	-26.2	0.7	-172	149	Moon in south.
21 / 22 Jun	-2.1	-0.7	-86	20	Moon in south.
28 / 29 Jun	25.9	-0.7	-9	35	Sun noise.
5 / 6 Jul	**4.4**	**0.7**	**+76**	**21**	**Day(PM).**
12 / 13 Jul	-26.4	0.6	+169	149	Moon in south.
19 / 20 Jul	1.7	-0.7	-104	19	Day(AM).Apogee.
26 / 27 Jul	26.5	-0.6	-27	29	Sun noise.
2 / 3 Aug	-0.6	0.8	+60	20	Moon in south.
9 / 10 Aug	-26.1	0.5	+151	41	Moon in south.
16 / 17 Aug	5.4	-0.8	-123	20	Night.Apogee.
23 / 24 Aug	**26.5**	**-0.5**	**-46**	**20**	**Day(AM).Apogee.**
30 / 31 Aug	-5.4	0.8	+43	20	Moon in south.
6 / 7 Sep	-24.9	0.4	+135	24	Moon in south.
13 / 14 Sep	9.1	-0.8	-142	20	Night.Apogee.
20 / 21 Sep	**25.9**	**-0.5**	**-65**	**20**	**Day(AM).**
27 / 28 Sep	-9.7	0.9	+26	20	Moon in south.
4 / 5 Oct	-22.9	0.3	+118	24	Moon in south.
11 / 12 Oct	12.7	-0.9	-161	24	Night.Apogee.
18 / 19 Oct	**24.8**	**-0.4**	**-85**	**14**	**Day(AM). ARRL I ??**
25 / 26 Oct	-13.3	0.9	+6	26	Moon in south.
1 / 2 Nov	-20.0	0.2	+100	18	Moon in south.
8 / 9 Nov	16.1	-0.9	+179	24	Night.Apogee.
15 / 16 Nov	**22.9**	**-0.3**	**-104**	**14**	**Day(AM). ARRL II ??**
22 / 23 Nov	-16.5	0.9	-14	26	Moon in south.
29 / 30 Nov	-16.8	0.1	+81	17	Moon in south.
6 / 7 Dec	19.2	-0.9	+160	24	Night.Apogee.
13 / 14 Dec	**20.2**	**-0.2**	**-123**	**12**	**Night.**
20 / 21 Dec	-19.5	1.0	-34	29	Moon in south.
27 / 28 Dec	-13.4	0.0	+61	17	Moon in south.

Sun Offset *vs* Time of Day for Visible Moon

-180°	-120°	-30°	0°	+30°	+120°	+180°
Night	Day(AM)	Sun noise			Day(PM)	Night

Tropo Reports

2m, 70cm and up

Editor: Tom Doelle, DG3FK
DG3FK@darc.de

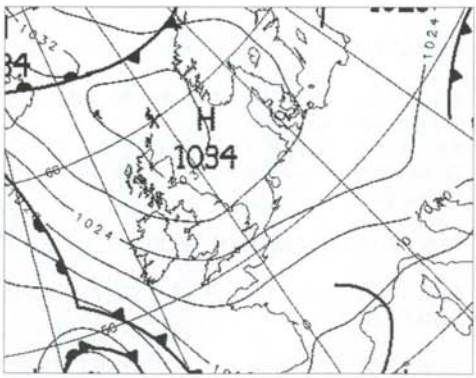
Tropo 2m:

DL8EBW, JO31nf, wkd > 600km:
07.07.02 (in Contest):
F5KMQ/p JN15 (757km) and lot of stations btw 400-500km. hrd only: EA2URE IN93 (1110km) and EE2DJB IN83 (1200km).
17.07.02: SK6DK JO67 (756km)
19.07.07: LA2PHA JO38 (760km)
03.08.02 F8BRK/p IN98 (598km)
06.08.02: (I was in front of our city...)
SK6DK JO67 (756km), SK7MW JO65 (607km), LA1T JO59 (896km), LA7M JO48 (809km), OZ1IEP JO55 (605km), OZ6ABA JO57 (715km), LA0BY JO59 (886km), G4ASR IO81 (700km), G4RRA IO80 (770km),
12.08.02: LA0BY JO49 (925km), F4CVK JN16 (600km), F4ARU IN94 (867km), F6KHM IN78 (872km), EA2LY/p IN71 CW (1333km), F6FHP IN94 (912km), F5MGD JN07 (abt 600km).
Beacons hrd: FX3THF IN88 559 (abt 750km) F5XAR IN87 539 (abt 850km)
13.08.02: EA2LY/p IN71 SSB (1333km), EB4EUB IN80 (1462km - tx 31 NC!).
Beacons hrd: FX3THF IN88 519 (abt 750km) F5XAR IN87 529 (abt 850km)
Tnx for info Guy!

F4CKV, JN16NM, wkd Tropo on 2m >600km:
14.9.2002 1027-1056 UTC:
G8LZG 53 58 IO93SR 841 km, G4YTL 55 57 IO92MB 683km, G4LOH 57 57 IO94IA 891km, G8RWG 55 57 JO01BN 602km, MW1MFY 53 55 IO81FL 735km, GW8ASA 52 54 IO81EW 776km.
15.9.2002 0528-1000 UTC:
GB0KDV 54 58 IO93DT 880km, G4KWQ 57 57 IO92AQ 777km, GW4VEQ 53 59 IO73SG 925km, **GI6ATZ 53 59 IO74OJ 1038km,** G3NAQ 59 59+10 IO91HL 641km, G8IYG 57 59+10 IO82XT 792km, G4RRA 59 59 IO80BS 698km, **GM3POI 57 59 IO88OW 1436km,** G0GMS 519 55 IO82XT 792km, PD0PVL 52 57 JO22XE 663km, GW8JLY 53 57 IO81JM 722km, **MM5DWW 53 52 IO89ID 1467km,** G4EHD 51 53 IO93BS 881, G4ZHI 53 55 IO91KN 640, GW1MCD 59 59 IO81LP 725, M5BXB 55 59 IO91XR 623, G0PQF 55 58 JO01BU 632, **MM3ERP 55 55 IO87RJ 1269km,** 2E1IDX 55 59 JO01BT 627, MW0AXA 52 55 IO81FM 738, **GM4YXI 55 59 IO87WJ 1261km,** G1WUU 55 57 IO80FH 648, GB0KDV 53 59 IO93DT 880, G4IUF/P 55 55 IO93FX 893, G4YQW/P 55 58 IO93EU 882, G3LTF 59 58 IO91GG 625, 1344z G4JZF 55 53 IO82XO 772, 1406z M0AYF 53 55 IO93FT 876, 1433z G4DEZ 57 55 JO03AE 773, 1501z G8XCK/P 57 55 IO91KG 613.
16.9.2002 1620-2245UTC:
G3TA 53 55 IO81XS 694, G6RSC 53 53 IO92AN 765, G6ZMX 53 55 IO91FQ 667, G0TPH 54 55 IO92IO 747, G1OGY 59 59 JO01GR 609, G3KPU 53 59 IO93MN 835, G4BRK 53 57 IO91DP 670, **EI5FK 53 53 IO51RU 1033km,** GW3LEW 53 58 IO71TS 798, **GI4SNA 55 55 IO64XM 1099km,** G0DCP 55 59 IO91WN 608, EI2FSB 51 52 IO5x NC, GW8ASD 51 54 IO83LB 851, G4DEZ 53 56 JO03AE 773.
17.9.2002:
1650z IS0/F6DBZ/P 53 57 JN40JV 773km
2158z GI6ATZ 53 59 IO74OJ 1038km
Rig: 1 KW + 2 x 17 Ele. Tnx for info!

Tropo 70cm:

F4CKV, JN16NM, wkd Tropo on 70cm >600km:
15.9.2002
0537z G4KWQ 51 51 432 IO92AQ 777km,
1002z G3LTF 52 53 432 IO91GG 625km,
1438z G4DEZ 53 54 432 JO03AE 773km.
16.9.2002:
2153z GW3LEW 41 41 432 IO71TS 798km.



13.9.2002
High pressure over the North Sea provided good tropo ducting on 2m and 70cm from September 13th to 17th from France to G, GM, GI and EI and also from DL to GI, G, EI.

6m News

Reports, Expeditions, Infos
Editor: Joachim Kraft, DL8HCZ
info@DUBUS.de

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

August to October 2002

11.8. 1100 Es from S-DL: TA2RC/0 KN51, EI7BMB/p IO41,
1800- TEP+Es fromW-DL: 7Q7SIX/B

14.8. 1700 TEP+Es from S-DL: 7Q7SIX/B

17.8. 1630 TEP from E-DL: V59PP/L JG77DI, 7Q7SIX

18.8. 1625-1700 TEP from S-DL: 9Q1A JI75, ZS6WB, ZS6TWB/B
18.8. 1835-50 from S+E-DL: LU9EHF/B

24.8. 08-09 Es from all DL: YI9OM LM23

25.8. 0800 Es from all DL: TA2RC/0 KN51DF

30.8. 1630-1730 TEP from all DL: ZS6NK KG46 ZS6OB 44, ZS6GVD KG45, ZR6DXB KG33, ZS6WB 44

2.9. 1620 TEP from S-DL: ZS6WB KG44

3.9. 1100 Es from M+S-DL: IH9/IK1ZNM JM56 (Pantelleria Island)
3.9. 2000-2145 TEP + Es from all DL: PY5CC GG54, PP1RO GG78, PP1BG, PY2XB GG66, PP1CZ/B

12.9. 13-14 TEP from S-DL: ZS3C KG21, ZS6

19.9. 13-14 TEP from all DL: ZS6WB KG44, ZS6AXT KG33

20.9. 13-15 TEP from all DL: TR8KPJ, TR8CA JJ40, TR0A/B, ZS6DXB KG33, ZS6NK, ZS6DN/B

25.9. 10-11 Es from all DL: IG9/I2ADN JM65, 9H9PA JM75

27.9. 1130-1600 TEP from M+S-DL: ZS6NK KG46, ZS6TWB/B, V51KC JG88 2100 5N6NDP JJ57

28.9. 0930 First F2 from Central-EU: VK6JQ PH12 wkd from G + hrd from M-DL.
1400-1450 F2 + E? from all DL: 5N6NDP JJ57, QSL via IK5JAN

1.10. 0805 F2 from W-Poland (JO80): VK6JQ PH12 12-23 Strong Aurora from all DL
19-20 Aurora-E from S+M-DL: LA7SIX, OH9SIX, SM2HTM KP07, LA2IM JP43, OH7PI KP32
22-23 Aurora-E from GW4VEQ IO73: VE8BY/B 51, OX3VHF, OX3SIX, JX7SIX

2.10. 1830 TEP + Es from all DL: 7Q7SIX/B

4.10. 12-14 TEP+E from S-DL: 7Q7SIX/B, ZS6NK

8.10. 0740-0830 F2 from S+E-DL: VK6JQ PH12; From 9A+I also DU1/GM4COK, VK8AH, VK8MS.
13-16 TEP from S + W-DL: S9TX, TR8CA

9.10. 12-14 TEP from all DL: TR8CA, TR0A/B, TR8KPJ

10.10. 1100 TEP from all DL: TR0A/B

11.10. 13-14 TEP from M+S-DL: TR0A/B

12.10. 1200-1530 TEP from all DL: TR0A/B, TR8CA, S9TX JJ30
22-00 First F2 Long pass from EA/I to JA

13.10. 0910-1050 F2 from S+M+E-DL: VK6JQ PH12

15.10. 1250 TEP from S-DL: TR0A/B

16.10. 0820-0930 F2 from S-DL: VK6JQ, JA5AIE 12-14 TEP TR0A/B

17.10. 1045 TEP from S-DL: TR0A/B, ZS6DN/B

18.10. 09-11 F2 from all DL: VK6JQ PH12.
1215 TEP from S-DL: 7Q7SIX/B

20.10. 08-09 F2 from S-DL: VK6JQ PH12

21.10. 08-11 F2 from S-DL: VK6JQ, VU2ZAP

22.10. 08-10 F2 from all DL: VK6JQ,
from M-DL: DU1EV, 9M2TO, JR6HI, JA5AIE
VK4`s were wkd from ON, PA
1220-1400 TEP from M+S-DL: ZS6, TR0A/B
1800 from W-DL: CX4CR GF05, LU9AEA
21-22 from W-DL: ZD7MY IH74

23.10. 0750-0900 F2 from W+M-DL: VK6JQ, VK4FNQ, VK4BLK QG56

Expeditions and News:

KM73 OD5/OK1MU is qrv for another year on 6m+2m (100w 9 Ele)

KP55 The OH8K group is qrv from 17.-19.11. on 50.218 MHz in SSB/CW for MS.

4U1 UN Geneva: S58J is on duty in Geneva until July 2003. He will try to activate 4U1ITU on 6m probably mostly on weekends.

5W West-Samoa: K7TVF is qrv from 18.11.-19.12. as 5W0VF also on 6m.. Beacon on 50.104 MHz.

7O Yemen: G(J)4ICD will be in Yemen several times this year for QRL. He will try to become qrv on 6m.

7Q Malawi: 7Q7HB was not able to be qrv on 6m in October.

8P Barbados: K4BAI is qrv from 10.-17.12. as 8P9HT also on 6m.. QSL via K4BAI.

9L Sierra Leone: From 7.11.-5.12. a British group will be active on 6m with the call 9L1AB. QSL via G3AB.

9M6 East-Malaysia: From Nov 18th to 25th JA1RJU is qrv again as 9M6JU on 6m. QSL via Homecall.

9Q Dem. Rep. Kongo: 9Q1A is still qrv on 6m from JI75PQ. QSL via F2YT.

C5 Gambia: OH9MM is qrv from 20.11.-1.12. on HF and 6m. Call: C53M. Locator: IK13

CY0 Sable Island: A group from VE plans to become qrv from Nov 15th to 25th also on 6m. Call: CY0MM.

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

FS Saint Martin: Ann/W2AZK, Brian/KF2HC, Gene/K2KJI, Maryann/K2RVH, Bob/W5GJ and Mike/WA2VUN will sign FS/homecall from December 4-11th also on 6m. QSL via homecalls.

FT/Z Amsterdam: F4DOT is qrv on 6m now until December. Locator MF82.

HC8 Galapagos: From 19.-25.11. N0JK is qrv again under HC8N on 6m. Other OPs of the team may be start some days before.

JD1 Ogasawara Isl.: Untill January 2003 8N1OGA is qrv on 6m. Loc: QL17. QSL. JA1MRM.

JX Jan Mayen: Per, JX7DFA, is back in LA now.

KH2 Guam: KG6DX is back to Guam and will be qrv again on 6m from October 2002.

KH0 Saipan: From 21.-26.11. JF2SKV will be qrv on 6m as NH0S. QSL via homecall.

OA Peru: OA/PA3GFE ist qrv until January 1st 2003 on 6m.

P4, Aruba: From 3.-17.12. K6KO and K6TA will be qrvon 6m as P40K and P40TA. QSL via WM6A

P5 North-Korea: P5/4L4FN is qrv also on 6m since Mai and had some pile-ups from JA. He worked with is HF-vertical.

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

TJ: From 16.10.-30.11. ex TT8DX will be qrv on 6m from Kameron, **TJ**. Then **5H, XT and TU or TR** will follow.(1.-31.12.). Rig: 100w + dipol.

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

YA Afghanistan: G4KUX is qrv on 6m now as YA4F. On Sept. 27th he worked VK6JQ.

YI Iraq: YI9OM is qrv from Baghdad on 6m. Loc.: LM23. He will stay there till Novemer. QSL via OM6TX. Next QRL will be in EP or YK. Peter will try to get a 6m licence...

YJ Vanuatu: YJ8UU, the only active 6m OP in YJ went QRT in October. He is back in ZL.

Beacons

OX3SIX, 50.012 MHz, HP16, is QRT since the beginning of October due to a storm damage. The OX hams will try to built a new antenna.

DU1EV, 50.008 MHz, PK04, 20 W, dipole.
QRV since mid October.

LU1DMA/B, 50.069 MHz, GF14, 10 W X-dipole.
QRV since October.

73s, see you on 6m! Joe, DL8HCZ/CT1HZE

FAI News

Reports, Infos

Editor: Joachim Kraft, DL8HCZ
info@DUBUS.de

Dear readers,
we still look for somebody who is interested in editing this column.
You just have to make a summary FAI-report (1 or 2 pages) one time per year in autumn. Preferably you should be located in the mediterranean area (e.g. EA, F, I, S5, 9A, YU). Please contact me via email info@DUBUS.de 73s, Joe, DL8HCZ

Summary Reports 2002

1.6.2002
F6FHP, IN94, wkd, QTF to JN36 scatter:
1652 LZ1KWT KN32AS
1655 T94KU JN95DA
1654 YU1EV KN04CN
1656 YU7KB JN94XX
1754 T90O JN95DA

9A1CAL, JN86EL, hrd:
1906 TM9R QTF 285

IZ1BPN, JN, hrd:
1947 EB3DYS QTF 05

OE6IWG, JN77, wkd:
2029 I8MPO JN70 51F

2.6.2002
S53VV, JN65UM, wkd:
1452 F6FHP JN94, QTF 290

S51MQ, JN75, wkd:
1945 EA3DXU JN11 55F

9A1CAL, JN86EL, wkd/hrd:
1958 F1EYB, JN23KK 55F hrd QTF 285
2023 F1EYB JN23KK 55 55 QTF 285
2044 F6DRO JN03 52F hrd QTF 285

3.6.2002
I4XCC, JN63, wkd:
0809 F/PA5MS 55 55 IN77UU SSB FAI

8.6.2002
9A1CAL, JN86EL, wkd:
2037 F1GTU 55 55 JN05IE QTF 300

SV3CYM hrd:
1932 EA3DXU JN11

19.6.2002
YU7EW, KN05HP, wkd:
1522 UT5JCW 559 559 KN64SN 60 deg 1020 km

27.6.2002
UT5JCW, KN64SN, wkd:
1856-2015 IC8FAX JN70CN 55F, QTF JN97
1907 YU7BCX KN05HO 55F
1916 YU7EW KN05HP 55F

YU7EW, KN05HP, wkd:
1807 UT5JCW 559 579 KN64sn, 44 deg 1020km
1917 UT5JCW 579 559 KN64sn, 65 deg 1020km

29.6.2002
UT5JCW, KN64SN wkd
1848 I4XCC JN63 QTF 300
1908 DL3RBH
1930 YU1EV KN04
1934 IC8FAX JN70

I4XCC, JN63, wkd CW:
1848 UT5JCW 559 559 KN64SN
1848 YO6FNA 559 559 KN36BA

3.7.2002
YO8RGJ, KN36KN hrd
1623 YU7EW + YU7KBY KN05 55 (FAI?)

UT5JCW, KN64SN, wkd:
1627 YU7 QTF 280

IC8FAX, JN70CN, wkd
1905 UT5JCW KN64 QTF 45
2055 EA2AGZ IN92
2146 EA1CRK IN73 QTF 280
2151 EA1BFZ IN81 QTF 280

9A1CAL, JN86EL, hrd/wkd:
2105 EA2AGZ IN91DV 54F hrd QTF 285
2112 EA3DUY JN12LD 54F hrd QTF 280
2134 F4BWJ 54 54 IN93MP QTF 280
2204 EA2AGZ 54 54 IN91DV QTF 285
2213 EA3DUY 54 51 JN12LD QTF 280

IZ4BEH, JN54, wkd:
2107 EA2AGZ IN91DV

EA3DUY, JN12LD, wkd:
2100 OE6IWG JN77
2112 S51ZO JN

IK1EGC, JN35, wkd:
2135 EA1RX IN52 QTF 300

EA5AGR, IM88WV, wkd:
2147 EA7OX IM77OV 55F

I5WBE, JN52, hrd:

2220 EA1RX IN52 51F

6.7.2002
IV3HVT, JN65, wkd:
1538 YO8WW KN36 (QTF to JN97)

1.8.2002
YU7EW, KN05HP, wkd:
1724 UT5JCW 539 539 KN64sn 60 deg 1020km

5.8.2002
9A1CAL, JN86, wkd:
1240 F6DRO JN03 41F QTF 280

Comments

Comment from most OP´s was that 2002 was a poor or very poor year regarding FAI openings.

YU7EW, KN05HP:
In 2002 I had no FAI openings to 275 deg., only hrd YU1 stations in FAI QSOs with EA and F, but no sig in my QTH! Also no sigs frm FAI point "Budapest". 73s Pista

9A1CAL (Op, 9A6WW), JN86EL:
Year 1999 was last "normal" FAI season here. In the past years FAI over HB9 (Geneva area) was almost every-day event during ES season. I was able to work EA3, EA6, I1, I8 and Mediterranean coast of France mostly in the evening hours (around 21 utc), sometimes with S9 reports. FAI openings over ON (Brussels) were more rare, but some yearly average was 5-10 openings to IN78 area.
Situation suddenly has been changed in the year 2000. Scatter over HB9 became a very rare event. Also, as you can see from my log, there was only one opening via ON scatter (F6CGJ). Openings over these scatter points became even more rare in the year 2001 and 2002. Similar reports I got from Italian stations too. IC8FAX is also reporting extreme decrease in the number of FAI events.
Partial explanation for that is quite a poor ES season. There is no FAI event without ES cloud in the scatter area. In previous years there was a very common evening ES peak over HB9 with MUF between 70 and 100 Mhz (more than enough to trigger FAI on 144). Lack of ES ionisation over HB9 during the last few years is obvious. However, some other reasons may be involved too. There is still no clear explanation why FAI "likes" some areas more than others, some irregularities in the magnetic field are may be the matter of change, too. Anyway, we will see in the next years if these changes are permanent or just temporary.

In the year 2000 I lost most of the active FAI scatter point of the past, but I discovered a new one. After one ES opening to Scandinavia, I hrd G0KPW and G4SWX (JO02 both) from QTF 345. According to antenna beaming and respecting rules of FAI reflection geometry, it seems that the scatter point should be somewhere over JO63-JO64. Well, there is nothing strange in the fact that FAI could appear over unusual locations after good ES openings, but it was a really nice surprise when I found that it was a quite common event. All tests I did with G4SWX, when the MUF over JO63/JO64 was 70 Mhz or higher, were successful!
I think this scatter was active during year 2001 and 2002 too, but G4SWX was not active during that period and other stations did not show too much interest to turn the antenna to JO63. Pity! As far as I know, G4SWX wkd more stations in 9A, I1, YU and YO, and it would be interesting to see his qso list. There is a common opinion among OP's in the north-western part of EU that FAI is a privilege of the south-european stations, and the scatter over ON was marked as the most northern known FAI scatter point for years. It seems that it is not true.
There were also a lot of FAI openings over this scatter point on six meter during 2002 and it is responsible for confusing situations when many six meter OP's were reporting "aurora". However, time will show, if it is a "common" scatter point or just a temporary event during the past few years (caused by the solar maximum?).

Conclusion and Hints

- it is not true that FAI is a privilege of southern Europe only. The scatter over JO63 is a good example.

- if you want to use the FAI scatter point over JO63, your location must be southern (or at least at the same latitude) from JO63 and you must turn your antenna to JO63

- power should be at least 300W and a good antenna system is recommended, although FAI sometimes allows qrp qso's

- if you are close to JO63 you must use elevation

- the location of your potential partner is very limited. Don't be surprised if you can not hear the QSO partner of stations 30-50 km away from you.

- there is a possibility for 2m FAI propagation over JO63 always when you notice good ES conditions on six with mid point over JO63. When the MUF ionization reach 70 MHz or more, be on alert! Remember that ES must have been present for some over an area to trigger FAI. FAI average duration

is 30 minutes to 2 hours, it can disappear and come back again

- FAI signals always have flutter. Always when electrons are moving, captured by the earth`s magnetic field, the reflected signal is fluttery (doppler) and field aligned (for a difference to static layer which does not produce flutter and allow reflection in all directions). There is absolutely no difference between FAI and aurora from that point of view, aurora is also field aligned, but spread on much bigger areas than FAI. FAI signals are generally more clear as AU signals, but if FAI is covering bigger areas, flutter could increase to au-flutter level

- do not to hesitate to turn your antenna to other directions (not only to JO63), especially after good ES. Nice FAI surprises are always possible, may be you discover a new FAI scatter point yourself!
- although you will hardly work new squares (or even a new callsingn) via FAI, after some time of using it, it is certainly an interesting type of propagation that is making the world of 2m so interesting and will sure bring you a lot of fun

It is really worth to try!
/3's Zvonko, 9A6WW (Op of 9A1CAL)

9A1CAL, JN86EL, FAI 2m Log

Year 2000
09.06. 20.34 EA2AGZ 55 53 IN91DV QTF 285
11.06. 20.39 F6CGJ 559 519 IN78RK QTF 305
13.06. 21.16 F/G8MBI 559 559 JN04FT QTF 285
13.06. 21.45 EA3ADW 559 559 JN11cq QTF 280
13.06. 21.52 IZ1BPN 559 559 JN35VG QTF 295
(His QTF: 45)
13.06. 21.55 IK1MZT 559 559 JN35UB QTF 295
10.07. 18.21 G4SWX 549 529 JO02PB QTF 345
(His QTF: 80)
10.07. 18.34 PA0PVW 419 519 JO22VA QTF 345
(His 1st FAI QSO EVER!)
10.07. 19.15 G4SWX 559 549 JO02PB QTF 345
13.07. 20.19 G4SWX 559 559 JO02PB QTF 345
25.07. 20.26 F4ARU 54 51-2 IN94VT QTF 290
25.07. 21.40 F6DRO 559 559 JN03SM QTF 285
27.07. 21.51 G4SWX 549 429 JO02PB QTF 345
06.08. 1715 G4SWX 559 559 JO02PB QTF 340

Year 2001
23.05. 13.23 G4SWX 549 529 JO02PB QTF 345
14.06. 20.23 EA3ADW 55 539 JN11CQ QTF 275
02.07. 18.31 G4SWX 559 559 JO02PB QTF 350
26.07. 20.30 EA3ADW 51 51 JN11CQ QTF 275
04.08. 20.02 F5SJP/P 55 52 JN14SC QTF 290
04.08. 20.22 F6FHP 57 55 IN94TR QTF 290

Year 2002
(late Es season, 1st 2m Es was on 04.06.)
02.06. 20.23 F1EYB 55 55 JN23KK QTF 285
08.06. 20.37 F1GTU 55 55 JN05IE QTF 300
03.07. 21.34 F4BWJ 54 54 IN93MP QTF 280
03.07. 22.04 EA2AGZ 54 54 IN91DV QTF 285
03.07. 22.13 EA3DUY 54 51 JN12LD QTF 280

9A1CAL, JN86EL, 2x17 el F9FT in the year 2000, 4 x 17 el F9FT in the years 2001 / 2002 (unfortunately no possibility of changing the elevation), pwr abt 500W.

DL8HCZ: Many thanks to all stations who have sent reports, especially to 9A6WW, Zvonko, for his helpful comments!
I think that the FAI propagation mode has been forgotten over the past years from many stations who have been active previously. And the few newcomers may have no idea how to work via FAI.
Hopefully this short abstract and the article from DF5AI in this issue helps a bit to get activity via FAI increased again.
Please keep sending your reports in the future!

73s
Joachim, DL8HCZ

Aurora Reports

Editor: Stefan Heck, LA0BY
LA0BY@qsl.net

The autumn surprised with a number of good Aurora openings, one of them during the IARU Region-1 VHF Contest, and another during the NAC. On 4.10.2002, DL5ZA in JO51CH spotted the beacon RB4NA in LP30VF in the DX-Cluster. Quite a distance for a 5 W beacon (2500 km!!!). RB4NA was received also by OH5LK.

Nice to see several (particularly German) no-code licensees operating in CW. Even new DO-calls were spotted on CW. That is good VHF practice!

73 and CU on Aurora – Stefan, LA0BY

DJ8ES in JO43SX wkd on 144 MHz:

2002-10-01

1404	GM3POI	IO88OW	59A	59A	30	934 km	
1409	SM7DLZ	JO86DE	55A	57A	30	494 km	
1417	MM0CEZ	IO75XU	55A	55A	30	891 km	
1427	RU1AA	KP40XD	55A	55A	30	1403 km	
1432	LA3BO	JO59CD	59A	59A	30	576 km	
1438	LA7VH	JO59EK	59A	59A	30	609 km	
1517	ES6RQ	KO28WA	57A	55A	30	1220 km	
1609	G7RG	IO90IR	59A	57A	30	818 km	
1646	GM4VVX	IO78TA	59A	59A	0	972 km	SSB
1715	SK3W	JP80JH	55A	55A	0	828 km	
1718	SK4BX	JO79OF	55A	55A	0	678 km	
1721	LA8WF	JO59GV	55A	55A	0	660 km	

2002-10-03

1508	LA4OGA	JO59LX	55A	56A	0	672 km	
1518	GM4VVX	IO78TA	55A	57A	0	972 km	
1527	LA0BY	JO59FW	57A	57A	0	665 km	
1620	OH5LK	KP30ON	57A	55A	0	1283 km	
1658	RX1AS	KO59FX	57A	53A	0	1423 km	ODX
1705	YL3AG	KO26AW	55A	55A	0	969 km	
1722	LA6BB	JO59QC	57A	57A	0	581 km	
1725	OH1LTE	KP00XX	57A	59A	0	1072 km	
1739	OH2KW	KP20IJ	57A	53A	0	1154 km	
1745	GM4ILS	IO87IP	57A	55A	0	897 km	

2002-10-04

1330	GM4VVX	IO78TA	57A	59A	350	972 km	
1612	OH5LK	KP30ON	55A	55A	350	1283 km	
1618	SM3BEI	JP81NG	55A	55A	350	926 km	
1628	LA0BY	JO59FW	55A	55A	350	665 km	
1644	ES6RQ	KO28WA	55A	55A	350	1220 km	

2002-10-07

1615	ES6RQ	KO28WA	59A	59A	0	1220 km	
1630	YL3AG	KO26AW	55A	55A	0	969 km	
1636	OH5LK	KP30ON	55A	56A	0	1283 km	
1640	SM5EFP	JO79WJ	55A	54A	0	715 km	
1748	SK5EW	JO79XB	55A	57A	0	688 km	

Equipment: FT-726R, PA 300W, 14-ele-DJ9BV-yagi
Tnx fer report, Wolfgang

DJ8MS in JO63CT wkd on 144 MHz :

2002-09-07

1617	LA0BY	JO59IX	51A	53A	691 km
1626	LA2AB	JO59FV	55A	55A	684 km
1629	SM4DXO	JP71IB	51A	52A	820 km
1639	LA3BO	JO59CD	53A	54A	605 km
1645	OH5LK	KP30ON	51A	55A	1170 km
1652	GM4ZUK/P	IO86RW	55A	57A	992 km
1714	GM4VVX	IO78TA	53A	59A	1130 km
1719	YL3AG	KO26AW	53A	57A	823 km
1721	GM3WOJ	IO77WS	53A	55A	1108 km
1735	ES2RJ	KO29JN	53A	57A	997 km
1738	SD5DS	JO88MW	53A	57A	642 km
1744	ES1AJ	KO29SK	55A	55A	1024 km
1747	SM5CUI	JO89WW	55A	54A	762 km
1758	LY2BIL	KO24PQ	53A	55A	854 km
1804	EW6FS	KO35LB	55A	59A	962 km
1813	SM4RPQ	JO79HH	55A	55A	629 km
1822	G4PIQ	JO01MU	55A	59A	780 km
1824	G8T	JO01KJ	57A	55A	810 km
1834	LY2IC	KO14WW	57A	59A	765 km
2226	GM3POI	IO88MW	55A	59A	1090 km
2237	SK5EW	JO79XB	55A	58A	627 km
2246	YL2LW	KO26CW	53A	59A	832 km
2320	G5Z	JO03AE	55A	55A	806 km

2002-09-08

0106	SM0WXV	JO89VL	52A	55A	716 km
0119	LA2PKA	JO59FK	55A	53A	634 km
0129	SM0EPO	JO89XM	59A	59A	725 km
0136	LY2BUU	KO15XH	53A	55A	774 km
0147	RW3PF	KO93CD	55A	59A	1712 km
0202	G5B	JO03CE	57A	55A	796 km

Equipment: 11el DL6WU Yagi + 350W + Preamp 0,5db NF
Tnx fer report, Toralf.

DL0FTG in J053CN wkd on 144 MHz:

2002-10-05

1450 LA2PHA JO38IB 55A 33A 0
hrd SM5EFP, LA5SKA, SK6DK, LA2AB, LA6BB, LA7XK, GM4VVX
Equipment: 8 W in 12-ele yagi
Tnx fer report, Joachim.

DL8HCZ in J053CN wkd on 144 MHz:

2002-10-07

1607 LA0BY JO59FW 59A 53A 10
Equipment: 8 W in 12-ele yagi
Tnx fer report, Joachim.

F4AZF in JN38IW wkd on 144 MHz:

2002-09-07

1813	GI6ATZ	IO74AJ	59A	59A	20	1061 km	SSB
1920	G4LOH	IO94IA	55A	55A	20	790 km	SSB
1940	GW8IZR	IO73TI	57A	57A	20	914 km	SSB

Equipment: 120W + 4 x 4.4wl yagi. Tnx fer report, Damien.

G4LOH in IO94IA wkd on 144 MHz:

2002-05-23

1706	OK1MG	JO70BD	53A	57A	
1709	OE5KE	JN78DF	55A	55A	
1713	HB9DFG	JN37SM	56A	57A	
1715	OK2EZ	JN99CT	55A	59A	
1715	HA5OV	JN97NJ	55A	59A	
1716	HA5UK	JN97OM	55A	59A	
1718	OM2TW	JN77UG	55A	59A	
1721	OE3JPC	JN87EW	57A	57A	
1721	F8OP	JN26MM	57A	57A	
1725	HB9DRD	JN47HI	57A	57A *)	
1727	S54M	JN86CL	57A	57A	
1728	9A1CAL	JN86EF	59A	59A	
1730	9A2RD	JN65TF	55A	55A	
1733	S51DI	JN76VL	53A	57A	
1735	HA1YA	JN87HF	59A	57A	
1736	HB9QQ	JN47TN	55A	59A	
1739	DL2JWN	JO60IW	53A	57A	
1743	DH0GHU	JN38VN	59A	57A	
1745	OK2YT	JN88TW	53A	55A	
1747	HB9BNI	JN37WB	57A	55A	
1754	G3BNE	JO01BJ	53A	53A	
1756	DF5DE	JO40CQ	55A	57A	
1800	DK5JM	JO40QS	55A	57A	
1801	DJ7RI	JO54CI	53A	54A	
1802	PA5WT	JO22HG	57A	58A	
1804	DL7UK	JO41SX	55A	55A	

*) HB9DRD was running 100 W into 6-ele indoor!

2002-09-07

1710	ES2RJ	KO29JN	59A	59A	
1713	LA0BY	JO59IX	59A	59A	
1718	LY2IC	KO14WW	52A	55A	
1724	OH5LK	KP30ON	57A	57A	
1729	ES1AJ	KO29HK	55A	59A	
1734	SM4DXO	JP81SB	55A	57A	
1753	EW6FS	KO35LB	59A!	59A!	
1810	LY2BIL	KO24PQ	59A	59A	
1816	SP8YCB	KO11GF	59A	59A	
1820	US5WU	KO20DI	55A	59A	

and others for a total of 60 stations

2002-10-01

1301	OY9JD	IP62OA	54A	55A	new DXCC
1304	SM6CMU	JO57XK	55A	59A	
1306	OH5LK	KP30ON	57A	57A	
1309	YL3DW	KO26CW	55A	59A	
1311	RU1AA	KP40XD	53A	57A	1989km
1313	OH7HDU	KP32RT	52A	55A	1919km
1400	SM2CEW	KP15CR	55A	57A	1831km
1714	ES6RQ	KO28WA	56A	55A	
1847	DD3SP	JO72EN	53A	55A	
1906	HB9DFG	JN37SM	52A	53A	
1922	DJ3AK	JO52GJ	52A	55A	

SM2CEW was also copied 529 on Ionoscatter.

2002-10-03

2055	SM4RPP	JO79HH	53A	55A	

2002-10-04

1555	GM4VVX	IO78TA	59A	58A	
1626	SM6ENG	JO67CQ	55A	55A	
1633	LA0BY	JO59FW	57A	59A	
1635	LA3PK	JO59KV	53A	57A	
1654	GM4ILS	IO87IP	57A	57A	
1708	LA2PHA	JO38IB	59A	59A	
1746	MM0CEZ	IO75XU	55A	55A	

Equipment: IC-756/LT2S, PA 400W, 4x18-ele-yagi, 260 m asl
Tnx fer report, Tim.

G4PIQ in JO01MU wkd on 144 MHz:

2002-09-07

1741	OH5LK	KP30ON	55A	55A	1868 km
1746	YL3AG	KO26AW	57A	57A	1584 km
1751	SM6X	JO68SF	57A	59A	1064 km
1757	LY2IC	KO14WW	55A	57A	1546 km
1811	DL5YM	JO62XN	55A	55A	883 km
1824	YL2LW	KO26CW	59A	59A	1594 km
1831	EW6FS	KO35LB	59A	59A	1743 km
1904	LA2ABJO59FV		59A	55A	1068 km

Equipment: FT1000MP + Tvtr + PA 400W, 3 x 15 el + 2 x 9 el
Tnx fer report, Andy.

HB9DFG in JN37SM wkd on 144 MHz:

2002-09-07

1742	DK1KO	JO53CT	55A	55A	20

2002-09-08

0136	GM4ZUK/P	IO86RW	56A	59A	10
0142	SK7MW	JO65MJ	56A	59A	10

Equipment: 400W + 7ele
Tnx fer report.

LA0BY in JO59IX/FW wkd on 144 MHz:

2002-09-07

1600	ES2RJ	KO29JN	59A	59A	788 km
1606	OH5LK	KP30ON	55A	55A	910 km
1609	GM4ZUK/P	IO86RW	57A	57A	840 km
1612	EW6FS	KO35LB	53A	59A	1110 km
1616	YL2LW	KO26CW	43A	59A	853 km
1617	YL3AG	KO26AW	57A	57A	844 km
1618	OH3BYZ	KP21UA	55A	57A	828 km
1619	DJ8MS	JO63CT	53A	51A	692 km
1620	DL1SUN	JO53PN	55A	55A	714 km
1622	LY2BIL	KO24PQ	52A	55A	1051 km
1623	RZ1AP	KO49VW	55A	55A	1059 km
1626	OH6PA	KP02PL	57A	58A	630 km
1627	OH4LJL	KP31HL	55A	57A	879 km
1629	DL1SUZ	JO53UN	52A	53A	716 km
1630	DF0TEC/P	JO73CF	56A	55A	780 km
1638	DL9MS	JO54WC	55A	55A	657 km
1640	DF0YY	JO62GD	57A	59A	878 km
1658	SM3VAC	JP83VA	59A	59A	505 km
1701	OH2LE	KP20DI	59A	59A	751 km
1703	DK0LK	JO42HG	53A	59A	867 km
1706	DL5YM	JO62XN	52A	55A	848 km
1706	SM2CKR	KP03DQ	55A	55A	649 km
1708	OH9NDD/6	KP23VH	54A	55A	876 km
1711	LY2BUU	KO15XH	52A	55A	941 km
1713	G4LOH	IO94IA	59A	59A	981 km

1715	ES2JL	KO29LL	55A	55A	799 km	0210	DL0GTH	JO50JP	57A	55A	1038 km	
1716	DF0CI	JO51CH	55A	55A	964 km	0216	DF0OL	JO40BP	56A	53A	1050 km	
1719	LY2IC	KO14WW	57A	57A	964 km	0218	DL0SAW	JO52KR	56A	59A	806 km	
1725	GM4CXP	IO85QN	56A	56A	928 km	0221	DK0QQ/P	JO32OH	55A	57A	879 km	
1728	SP2FAV	JO94MA	59A	59A	832 km	0223	DK0XA	JO43WJ	57A	55A	734 km	
1730	PA3BGM	JO33CE	57A	55A	803 km	0238	DL1XAQ	JO53CN	56A	59A	714 km	
1736	DL3SWS	JO53SG	57A	55A	748 km	0240	G8T	JO01KJ	55A	55A	1134 km	
1743	OK1KIM	JO60RN	55A	55A	1061 km	0306	LA6QBA	JP61BJ	57A	55A	175 km	
1752	DL0SX/P	JO44SM	55A	55A	611 km	2002-09-11						
1805	OM0C	JN99PG	52A	59A	1310 km	1611	PA5DD	JO22IC	55A	55A	10 941 km	
1813	SP1CNV	JO84CF	55A	57A	720 km	1612	G4KWQ	IO92AQ	52A	52A	0 1108 km	
1816	DK3RA	JO53LU	55A	59A	681 km	1617	DA0JF	JO62SP	57A	58A	30 833 km	
1818	DF0MTL	JO60OM	56A	57A	1063 km	1622	DL7FF	JO62TJ	57A	57A	30 861 km	
1821	SP7ASQ	JO91RS	55A	55A	1061 km	1625	LY2BH	KO25DR	52A	53A	30 941 km	
1823	DL1VPL	JO61UA	54A	57A	1014 km	1645	DL1KDA	JO30FQ	55A	53A	10 1059 km	
1824	DL3BUE	JO72FH	57A	57A	883 km	1655	DF1RL	JO43MW	55A	55A	30 673 km	
1826	OK1ES/P	JO70UR	52A	57A	1075 km	1657	DL1SUN	JO53PN	56A	57A	30 711 km	
1828	DK7BY	JO33RP	53A	55A	731 km	1755	DL8BDU	JO43AA	55A	52A	10 783 km	
1831	PI4GN	JO33II	55A	59A	776 km	2002-09-30						
1834	DL0WAE	JO42DC	57A	59A	888 km	1355	GM3POI	IO88OW	57A	59A	0 756 km	
1840	PA6NL	JO21BX	57A	59A	978 km	2002-10-01						
1846	ES6DO	KO27WX	55A	59A	895 km	1306	SP3VSC	JO92DF	59A	59A	40 984 km	SSB
1858	SP6TRP/6	JO70RU	57A	59A	1057 km	1310	DL1REM	JO32MF	51A	51A	10 883 km	
1903	SM7SLU	JO65ML	55A	55A	519 km	1314	SP2MSL	JO94NM	56A	58A	40 796 km	SSB
1910	DL1HBT/P	JO43JK	55A	54A	737 km	1635	OH7HXH	KP53HG	53A	55A	1109 km	
1915	DK1KO	JO53CT	57A	55A	686 km	1637	ES5KJ	KO38IJ	55A	55A	926 km	
1920	OK2KYC	JN99BM	52A	599	1255 km	1639	OH5SA	KP41BB	54A	58A	958 km	
1921	OL7Q	JN99FN	55A	59A	1258 km	1642	DF0WD	JO42FD	55A	55A	882 km	
1925	DL0XM	JO61BA	55A	59A	1000 km	1645	RX1AS	KO59FX	56A	57A	1095 km	
1935	SP7RFE	KO01CX	53A	55A	1066 km	1646	DL3BCR	JO33HK	53A	55A	769 km	
1939	SP2MKI	JO93AC	55A	59A	886 km	1649	YL3DW	KO26CW	57A	57A	853 km	
1951	SP2CNW	JO93AD	55A	59A	882 km	1652	OH6MAZ	KP21IG	55A	57A	775 km	
2002	ES1AJ	KO29HK	55A	55A	781 km	1700	RU1AA	KP40XD	59A	59A	1065 km	
2056	LY2BAW	KO25KA	55A	55A	1007 km	1704	RZ1AP	KO49VW	57A	55A	1059 km	
2215	YL2OW	KO27FJ	55A	55A	843 km	1705	OH0AZ	JP90XI	57A	59A	513 km	
2233	GM3POI	IO88OW	56A	59A	770 km	1713	LA8G	JP53GJ	57A	55A	380 km	
2245	DL3LED/P	JO53CJ	43A	55A	733 km	1714	SM3RIU	JP93IG	55A	57A	558 km	
2256	OK1KHI	JO70GU	57A	57A	1043 km	1719	SM3VAC	JP83VA	59A	59A	505 km	
2308	OH6NVQ	KP13IQ	57A	57A	751 km	1720	OH6QR	KP22BN	57A	59A	771 km	
2313	SN7L	JO91QF	55A	55A	1113 km	1758	DF0WD	JO42FD	55A	55A	882 km	
2334	SP3KCL/3	JO72SJ	53A	55A	894 km	1802	G4LOH	IO94IA	57A	56A	300 981 km	
2336	SP3FLR/3	JO72SJ	53A	55A	894 km	1804	DL0VV	JO54VC	55A	55A	320 657 km	
2341	OH3BHL	KP10RR	59A	55A	705 km	1805	G4SWX	JO02PB	53A	55A	300 1055 km	
2002-09-08						1836	ES2NA	KO29JL	45A	57A	790 km	
0007	OH2KW	KP20IJ	55A	55A	774 km	1838	OH5LK	KP30ON	56A	56A	910 km	
0015	SP1MVG	JO73FJ	51A	51A	767 km	1846	ES2JL	KO29LL	57A	57A	799 km	
0043	OK1KPU	JO60VR	59A	59A	1047 km	2040	GM3POI	IO88OW	55A	59A	770 km	
0059	G5B	JO03CE	55A	59A	990 km	2052	OH2KW	KP20IJ	55A	53A	774 km	
0102	OR2A	JO10UU	56A	55A	1105 km	2054	ES2DF	KO29GG	52A	55A	780 km	
0113	SQ2EEQ	JO94HI	55A	55A	786 km	2058	OH7HDU	KP32RT	52A	51A	942 km	
0116	PI4ZOD	JO32LU	59A	59A	825 km	2059	LY3ED	KO14UX	55A	55A	953 km	
0121	SP9KDA/P	JO90OA	55A	59A	1231 km	2105	LY2BIL	KO24PQ	55A	57A	1051 km	
0126	G4Z	JO03AE	55A	55A	996 km	2114	RA3LE	KO64AR	55A	55A	50 1398 km	
0131	OK2KKW	JO60JJ	59A	59A	1074 km	2118	DJ8MS	JO63CT	56A	55A	692 km	
0146	PE1RLF/P	JO32BF	55A	55A	907 km	2126	DO2HH	JO53CJ	55A	55A	733 km	
0155	DA0TT	JO43VI	59A	55A	739 km	2142	DL2BRW	JO72GI	55A	55A	880 km	
0202	DK0UKW	JO31OM	57A	55A	965 km	2157	OH5KCJ	KP30JS	55A	55A	886 km	
0204	DJ8SP	JO30EM	57A	57A	1086 km	2204	DL6BF	JO32QI	55A	55A	872 km	

2212 OH7C KP32RT 56A 57A 942 km
2216 OH3NHF KP11WL 57A 58A 734 km
2219 ES1AO KO29HL 52A 56A 781 km
Equipment: IC-821H, PA 180 W, single or 2 x 9-ele yagi

OH5LK in KP30ON wkd on 432 MHz:

2002-10-01
2118 RA3LE KO64AR 57A HRD
2002-10-04
1434 UA3DHC 58A HRD
Tnx fer report, Jussi.

OH6PA in KP12PL wkd on 144 MHz:

2002-09-07
1422 OH5LK KP30 59A 59A 0-10 379 km
1427 SD5DS JO88 55A 55A 0-10 456 km
1431 SK3MF JP92 59A 57A 0-10 153 km
1434 SM4DXO JP71 59A 59A 0-10 341 km
1446 SM3AKW JP92 59A 59A 0-10 167 km
1501 ES1DO KO27 55A 44A 0-10 560 km
1512 LA2AB JO59 57A 55A 0-10 646 km
1514 SM2CKR KP03 59A 59A 0-10 143 km
1518 SK6DK JO67 55A 55A 0-10 758 km
1522 YL3AG KO26 55A 55A 0-10 634 km
1533 YL3DW KO26 55A 55A 0-10 637 km
1541 RZ1AP KO49 59A 59A 0-10 572 km
1545 YL2LW KO26 44A 59A 0-10 637 km
1548 OH4LJL KP31 58A 59A 0-10 300 km
1551 OH3BYZ KP21 58A 59A 0-10 283 km
1616 ES2RJ KO29 59A 59A 0-10 375 km
1620 LA3BO JO59 44A 42A 0-10 704 km
1626 LA0BY JO59 58A 57A 0-10 629 km
1635 SM4HFI JP70 44A 44A 0-10 365 km
1637 OH2LE KP20 56A 55A 0-10 285 km
1653 SM3VAC JP83 59A 59A 0-10 209 km
1659 SK7MW JO65 55A 59A 0-10 916 km
1704 LY2IC KO14 55A 55A 0-10 851 km
1715 ES2AJ KO29 55A 55A 0-10 383 km
Equipment: TS 700G + preamp BF981, PA 80W from QQE 06/40, 8-over-8 Slotbeam. Tnx fer report, Ben.

OM/S57C/P in KN09CE wkd on 144 MHz:

2002-09-08
0121 SK6DK JO67EH 59A 59A 1042 km
0123 SM0WXV JO89VL 59A 59A 1155 km
0125 SM0KAK JO89XK 59A 57A 1149 km
0128 SM5CUI JO89WW 59A 59A 1205 km
0131 DK0NK/P JO71AN 59A 59A 511 km
0132 DJ2IA JO71AN 59A 59A 511 km
0134 G4FUF JO01GN 59A 57A 1415 km
0136 YL3AG KO26AW 59A 59A 899 km
0139 SM7DLZ JO86DE 55A 59A 822 km
0148 SM0EPO JO89XM 59A 59A 1158 km
0159 SK7MW JO65MJ 59A 59A 844 km
0223 GM4ZUK/P IO86RW 55A 55A 1736 km
Equipment: IC275H, 3CX800, 4x4 el. Yagi/2x12 el. Yagi
Tnx fer report, Branko.

SN7L in JO91QF wkd on 144 MHz:

2002-09-07
1817 GM3WOJ IO77WS 55A 55A 1671 km
1821 LA3BO JO59CD 55A 55A 1053 km
1822 ES2RJ KO29JN 59A 57A 987 km
2314 LA0BY JO59IX 55A 55A 1113 km
2002-09-08
0103 SM5CUI JO89WW 59A 57A 973 km
Equipment: 100W + 9-ele. Tnx fer report.

SP9AMH/P in JO90RM wkd on 144 MHz:

2002-09-07
1831 G4LOH IO94IA 59A 59A 1459 km
2002-09-08
0138 G7RAU IO90IR 59A 59A 1460 km
Equipment: 40W + 10-ele
Tnx fer report.

Meteor Scatter

HSCW - SSB - WSJT - Reports

Editor: Norbert Göttsche
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Dear Readers, don't forget to send in all your reports, experiences and comments about the MS avtivity! Also experiences and reports about WSJT on 6m, 2m and 70cm are very welcome!
It happens sometimes that I can't recognize what column of your report includes the number of bursts or pings or the tx/rx report. Please don't forget to give me a short hint. In this column the order is bursts, pings and seconds. And here is again the meaning of the short cuts: c = complete, bs = backscatter, m = many, nc = not complete, nil = not in log (no reflections!), r = random, s = ssb, sc = sidescatter, t = tailend, nfr = no final rogers.
Please send your reports to my email address dl8laq@gmx.de or via PR to:
DL8LAQ@DB0HB.#HH.DEU.EU
73, Norbert.

DJ8ES (JO43SX) wkd on 144 Mhz WSJT (FSK441, all random):

2002-07-14

0930	F5PAU	IN88CB	26	27	1138km
1212	F6DHI	JN23RK	26	26	1209km
1355	OH6KTL	KP02OJ	26	27	1155km

2002-07-15

2000	IC8FAX	JN70CN	26	27	1532km
2035	S51AT	JN75GW	26	27	962km
2108	IW3BKQ	JN56NH	26	27	860km

2002-07-16

1925	OH1JCS	KP10AE	26	27	1020km

2002-07-19

1758	OH6KTL	KP02OJ	26	26	1155km
1820	SK3MF	JP92FW	26	27	1120km
1907	OH6MAZ	KP22WG	26	27	1323km
2030	IK0BZY	JN61GW	26	27	1357km
2117	IC8FAX	JN70CN	26	27	1532km
2150	IW2BSQ	JN45UJ	26	26	954km
2220	S51AT	JN75GW	26	26	962km

2002-07-20

1110	OH6HFX	KP14RA	27	26	1365km
1345	F6FHP	IN94TR	26	27	1252km
1515	S52LM	JN65TX	26	26	936km
1645	S53VV	JN65UM	26	27	986km

2002-08-06

1515	RA3DQ	KO85US	26	37	1800km
1600	ES8X	KO18XC	26	26	1003km
1605	RW3AZ/1	KO55JR	36	27	1368km
2040	ES1RF/3	KO29IF	26	26	1092km
2150	RK3FG	KO86HP	26	27	1727km
2245	RX1AS	KO59FX	26	27	1423km
2325	LY2BIL	KO24PQ	26	27	1022km

2002-08-07

1405	RA3DQ	KO85US	26	37	1800km
2007	RU1AA	KP40XD	26	27	1403km
2102	RX1AS	KO59FX	37	26	1423km

2002-08-08

1032	LY2SA	KO14LL	26	37	872km
1049	RA3DRC/1	KO55JR	26	27	1368km
1202	UA1AFA	KO59EV	26	27	1416km
1633	OH1JCS	KP10AE	26	26	1020km
2040	SM3/DL1RNW	JP72LB	26	26	953km
2115	IK4PMB	JN54II	26	27	1073km

2002-08-09

1146	IK0BZY	JN61GW	26	26	1357km
1545	OM3WBC	JN98VC	26	27	968km

2002-08-10

1252	F6DHI	JN23RK	26	26	1209km
1950	RK3FG	KO86HP	26	27	1727km
2329	IC8FAX	JN70CN	36	26	1532km

2002-08-11

0040	UT5JCW	KN64SJ	27	27	2028km
0915	OH7PI	KP32XG	27	27	1412km
1015	UR5TW	KN39MK	26	26	1303km
1040	IK3MTZ	JN35UB	37	26	1000km

2002-08-12

1715	HA5KDQ	JN97LN	26	27	972km
1755	9A1CCY	JN85OO	26	28	1080km
2054	IK2DDR	JN55GN	36	27	938km
2104	YU7KB	JN94XX	27	39	1249km
2130	HA6NN	JN98VC	27	37	968km
2342	SM3JLA	JP93LH	39	27	1169km

2002-08-13

1830	IC8FAX	JN70CN	26	27	1532km
1908	YU1CF	KN03QN	26	26	1442km
2020	9A1CCY	JN85OO	26	27	1080km

2002-08-24

1225	F6DHI	JN23RK	26	26	1209km
1445	I6BQI	JN72BK	26	26	1326km

2002-08-25

1805	F1JG	JN23HQ	26	27	1199km

2002-08-29

1905	I6BQI	JN72BK	26	27	1326km
2050	IW2BSQ	JN45UJ	26	26	954km

2002-09-01

1940	EA3DUY	JN12LD	27	27	1402km
2050	IS0/OE6IWG	JN40US	26	27	1468km

2002-09-30

1915	F6DHI	JN23RK	26	26	1209km
1945	F1JG	JN23HQ	26	26	1199km

Equipment: FT-726R, PA 300W, 17el Yagi, PreAmp NF=0,8dB.

LA/DJ8ES/p (JP21PI) wkd on 2m WSJT:

2002-07-29

2115	DF2ZC	JO30RN	26	26	1207km
2220	DG0KW	JO64MH	26	26	906km
2245	DG8UAW	JN48BR	26	26	1415km odx
2305	DL1UU	JO62SP	26	26	1087km

2337 PE1HWO JO21GV 26 26 1052km
2002-07-30
0010 DG6JF/P JO32QN 26 26 985km
2002-07-31
1940 DL5WG JO52VK 26 26 1066km
2028 DL3BUE JO72FH 26 26 1147km
2040 DJ8MS JO63CT 26 27 933km
Equipment: FT225RD (Mutec-Frontend), PA 200W, 17el Yagi.

WSJT (FSK441) ist eine faszinierende Betriebsart. Sie bietet auch Amateuren ohne entsprechnede CW-Kenntnisse die Möglichkeit Meteor-Scatter-Betrieb zu machen. Allerdings ist dazu ein PC bzw. Laptop mit Soundkarte notwendig. Dies ist heutzutage aber schon mehr oder weniger Standard im Shack, zumindest bei denjenigen die sich mit modernen Betriebsarten befassen.
Als weitere Voraussetzung ist eine halbwegs genaue Frequenzeinstellung am Transceiver. Die Software verlangt zur Decodierung der Signale eine Einstellgenauigkeit von +/- 100Hz. Dies ist nicht bei allen Transceivern gegeben. Im praktischen Betrieb ist dies auch bei verschiedenen Stationen deutlich zu sehen. Abweichungen von bis zu 500Hz sind üblich.
Glücklicherweise bietet die Software eine Anzeige des Frequenzganges des Empfangssignals mit eingeblendeten Marken für die Sollfrequenzen. Mit einer gewissen Erfahrung lässt sich so ein Frequenzversatz der Gegenstation schnell nachregeln.
Darüber hinaus ist eine gewisse Disziplin in Sachen Zeiteinstellung notwendig. Insbesonderes bei Meteoritenschauern tümmeln sich auf 144,370 MHz eine Vielzahl von Stationen. Ist nur eine dieser Stationen um einige Sekunden zeitversetzt, so ´sehen´ das die anderen sofort. Wird dann sogar der Standard zum Senden in der 2. Periode (30. - 59. sec) für Mitteleuropa und 1. Periode (0. - 29. sec) für die uumliegenden Regionen nicht eingehalten, ist sofort die Frequenz für alle Stationen im Umkreis von 200-300km blockiert. Leider kommt das sporadisch vor.
Nichts desto trotz mach es riesig Spaß in dieser neuen Betriebsart zu arbeiten. WSJT hat sich rasend schnell ausgebreitet und ist offensichtlich allseits positiv eingeschlagen. Die überragende Aktivität europaweit während und vor bzw. nach den großen Meteoritenschauern spricht für sich.
vy 73, Wolfgang (DJ8ES)
Thanks for your report, Wolfgang.

Holiday in Spain by DF2ZC

Below please find my QSO report from my this years's holiday in Spain. Equipment was a Kenwood TS2000, 4CX250B with some 300 watts in FSK441, 9 ele TONNA and a MGF1302 at the antenna. Cable was just 7m AIRCOM+. You may soon find some JPGS on my home page www.df2zc.de
Just some comments:
I worked random most of the time, the few skeds or tailenders are marked with S or TE. Whilst on Random I couldn't understand why some people continued calling me over long periods though I was replying for another callsign and had not yet completed. This made some QSOs take more time than necessary.
Also entering a report together with both callsigns when replying to my cq call would have speeded up some QSOs. According to MS procedures this is permitted and also logical - if you really heard me and not called only because of a cluster message. FSK441 has such a high throughput that even in short pings all these data come through.
I am certain that in HSCW instead of FSK441 only less than 50% of the QSOs would have been completed, particularly not the QSO with OZ1IEP when reflexions very very short.
Sorry for those not worked. Anyway, in case you need the JM08 grid don't worry: EA5/DJ4UF (http://www.qsl.net/dj4uf/) will stay in JM08BR from now until the mid of May next year. Eckart works with a 11 elements F9FT and has a wonderful takeoff from about 35 degrees through East to at least 215 degrees. As his house is about 300 m high on the slope of a hill the vhf situation is by far better than mine in JM08CR (which wasn't bad at all) with just 40 m above sealevel. Eckart will frequently call CQ and is also happy to make skeds. You can email him at dj4uf@winlink.org, but please plain text only and as short as possible as he collects his emails on Pactor via HF at slow data transfer rates.
I left my amplifier with him so he has some 300 watts now. I may only need the small PA again in automn 2003 for my next holiday, possibly in JM76. I also left my portable 9 ele F9FT with him, together with my MGF1302. DJ4UF may activate some squares in EA over the next few months.
QSLs with SASE to my address in QRZ.COM or via club.
73 Bernd - DF2ZC (JO30RN) - www.df2zc.de
Equipment: Kenwood TS 2000, 2 x GU74b by LZ2US (www.qsl.net/lz2us), 4 x 17 el F9FT full elevation, MGF 1302 in masthead (www.shf-elektronik.de), JUDSP dsp filter (www.qsl.net/dk6ju/d_handbuch/manual0.html), Spectrum Lab FFT signal detection by DL4YHF (www.qsl.net/dl4yhf).

EA5/DF2ZC (JM08CR) wkd on 144 MHz:

2002-10-05
0545 0608 DG6JF/P JO33QN 26 27 c 1737km
0715 0745 G4HGI IO83PL 26 26 c s 1655km
0823 0843 G0GMS IO82XT 26 37 c te 1575km
18s burst from me at G0GMS
0845 0904 GW8ASA IO81EM 27 26 c tr 1453km
1030 1100 ON1IM JO11UB 27 26 c s 1398km
2002-10-06
0615 0628 G4ZHI IO91KN 27 27 c s 1430km
0720 0800 DK5LA JO44TR 27 27 c 1915km
Him 300 watts at 20 el collinear on the loft (!)
0830 0844 DL4ANT JO61QH 27 27 c 1736km
0818 0858 DH7FB JO62TM 27 26 c 1850km
0900 0922 IK4PMB JN54II 27 27 nc 1075km no RRR
0922 0941 PA1GYS JO22WW 27 27 c 1639km
0948 1020 S59F JN65TX 26 26 nc 1365km no RRR
1020 1028 IK4PMB JN54II 27 27 c 1075km
2002-10-07

1850	1911	DF8IK	JO30JT	27	26	c 1439km
1917	1928	DL6ZAU	JO40JF	26	26	c 1447km
2002	2014	OZ1IEP	JO55XU	26	26	c 2095km ODX
2034	2047	IK0BZY	JN61GW	26	26	nc 1106km no R
2048	2105	DH0AAI	JO51AR	26	26	c 1635km
2115	2126	DJ3LE	JO44TN	26	26	c 1898km
2112	2128	OZ1LPR	JO44WX	26	26	c 1947km
2133	2142	DL1GGT	JN58AO	26	27	c 1352km
2136	2201	DL1RNW	JO62GH	26	26	c? 1786km
2002-10-08						
1840	1901	DL2OM	JO30SN	27	26	c s 1436km
1910	1943	DL4ANT	JN49LF	26	26	c 1360km
2000	2100	DJ8MS	JO63CT	26	26	c s 1909km
2120	2150	IW2BSQ	JN45UJ	26	26	nc 1079km no R
2002-10-10						
1904	1932	DC9YC	JO31PI	27	26	c 1509km
1941	2011	DL1RNW	JO62GH	26	26	c? 1786km
1955	2018	IW2BSQ	JN45UJ	26	26	c 1079km
2038	2044	DJ3LE	JN44TN	26	26	c 1898km
2047	2056	S52LM	JN65TX	26	26	c 1365km
2102	2132	SP3VSC	JO92DF	26	26	c? 2051km
2136	2145	DL0UL	JN48NO	26	27	c 1310km
2002-10-11						
0600	0630	GW4VEQ	IO73SG	26	26	c s 1656km
0630	0702	GW3HWR	IO71XN	26	27	c 1465km
0711	0733	G4RRA	IO80BS	27	27	c 1376km
0749	0830	DH8IAT	JN49GC	26	27	c 1331km

Thanks for your report, Bernd.

ES1RF/3 (KO29IF) wkd on 144 MHz WSJT:

2002-08-05					
2119	DG8UAW	JO48BR	27	26	949km
2207	DO1EL		27	26	
2223	DJ7OF	JO51HQ	26	27	1216km
2248	PE1GNP	JO31IX	26	27	3b 920s 1381km
2002-08-06					
2023	DJ8ES	JO43SW	27	26	1095km
2002-08-07					
0646	DL5WG	JO52WG	27	27	5b 1111km
0730	DG6JF/P	JO33QN	26	27	1233km
2013	9A1CMS	JN86EL	26	26	1521km
2155	DD3SP	JO72EN	26	27	980km
2002-08-08					
0550	DJ5BV	JO30KI	26	26	1501km
0618	DL4DWA	JO61QF	26	26	1140km
0638	S54M	JN86CL	28	26	1525km
1020	DG9BEM	JO43CD	37	26	1219km
2108	I4LCK	JN54RK	28	26	1872km
2002-08-09					
1923	DD6UBS	JO41AH	27	27	3b 1368km
1926	DL7FF	JO62TJ	27	27	3b 1025km
2100	DH3VE	JN39KK	27	27	1578km
2139	HA7UL	JN97KK	27	27	3b 1365km
2200	OK2BRD	JN49RU	27	27	1426km
2235	SP6IWQ	JO80HK	27	27	1104km
2002-08-10					
0626	PA0ZM	JO32GK	27	27	1356km
0642	DG2KBC	JN58MI	27	27	1499km
0653	DL3HRT	JO61AB	27	27	1209km
0709	ON4ANT	JO20AR	28	27	1611km
0717	DJ9CZ	JO31BC	28	27	1477km
2120	DL2ALF	JO50IW	27	26	1277km
2244	OK2ZW	JN89HI	26	27	1215km
2308	OK1MDK	JN79PX	27	27	1191km
2002-08-11					
0017	RV3ZR	KO80CL	26	27	1216km
0037	UT5JCW	KN64SN	26	27	1736km
1352	HB9MM	JN36HP	27	26	4b 3sec 1838km
2002-08-12					
0643	S53VV	JN65UM	38	27	1692km
1051	DF2ZC	JO30RN	27	27	1457km
1145	OZ3K	JO45TL	27	27	993km
1204	GW8IZR	IO73TI	26	37	1891km
1451	G3IMV	IO91OX	26	26	3b 30sec 1778km
2250	UT5JCW	KN64SN	27	27	1736km
2251	Y04RXX	KN45	26	27	
2330	YU7KB	JN94XX	27	27	1616km
2341	YO4BZC	KN45AK	27	27	1549km
2002-08-13					
1200	HB9FA/P	JN46EW	26	26	hscw 12b 4sec 1738km
2007	HB9SNR	JN36MH	27	27	8b 4sec 1852km
2128	OK1UAK	JO70MB	27	27	1191km
2148	PA0JMV	JO21PM	27	27	1487km
2338	UT5DL	KN18MM	27	27	17sec 1195km

Rig: FT-847/FT-736R, home build PA GU-74B, 4 x 9 el. Yagi 21m agl, Mast preamp, OH5IY+DTR+WSJT. 73, Gennadi.
Thanks for your report, Gennadi.

DXpedition to JO49ML by LA0BY and DL3YEL (Aug. 11-14, 2002):

LA0BY/p (JO49ML) wkd on 144 MHz:

2002-08-11										
1710	1740	OH8K	KP45CB	27	27	16	4	15		c
1800	1900	RW3TU	LO25BR							nil
1810	1835	UA1AFA	KO59EV	27	39	11	3	10		c r
1835	1902	RU1AA	KP40XD	39	27	m	m			c r
1900	2000	RA3DQT	KO95HK							nil
2000	2035	RW3PF	KO93CD	27		2				nc
2035	2047	RA3IS	KO76WT	37	26	3				c
2100	2145	UT5ER	KN78ER	27	27	6	4	15		c
2018km										
2145	2157	RX1AS	KO59FX	27	39	m	m			c r
2200	2232	YU7KB	JN94XX	27	27	28	12	90		c
2235	2300	YU7AZX	KN04AX	38	27	11	4	8		c r
2325	2340	S51AT	JN75GW	27	37	6	2	20		c r
2315	2327	OK1UAK	JO70MB	26	27	7	15	1		c r
2002-08-12										
0000	0022	I5TWK/8	JN70GR	38	26	9	1	20		c
2120km										
0018	0035	I4XCC	JN63GV	28	38	15	6	3		c r
0035	0050	HA6NY	JN98WC	27	27	5		10		c r
0050	0102	S57TW	JN75EX	37	27	7		3		c r
0100	0115	F5LRL	JN26MV							nil
0115	0135	DF1BN	JO31GD	37	28	7	7	7		c

0210	0237	PE1HWO	JO21GV	28	27	20	8	30		c
0300	0327	GW8IZR	IO73TI	26	26	10		20		c
0345	0357	ON4AVJ	JO11UB	28	27	10	22	12		cr
0400	0427	IZ4AIK	JN63HV	27	26	m	m	40		c
0430	0450	DL3HRT	JO61AB	26	26	3	14	7		cr
0500	0522	EI5FK	IO51RT	26	26	7	19	12		c
0525	0540	G1HWY	IO90UV	46	27	5	9	50		c
0600	0612	HA5OV	JN97NJ	27	38	m	m	10		c
0709		F6CBH	JN19BH	27	37	1				crs
0714	0729	F6FHP	IN94TR	37	37					crs
0726	0734	IW2HAJ	JN45NO	37	37					cs
0738	0746	DL8GP	JN39LH	37	27					crs
0744		F6DRO	JN03TJ	37						ncrs
0753		IZ4BEH	JN54WL	38	38	1				crs
0754		F5JNX	JN37PV	37	27	1				crs
0759		F6DKW	JN18CS	39	39	1				crs
0800	0840	EA6VQ	JM19HN							nil
0840	0850	DF8IK	JO30JT	27	27	5	7	2		cr
0908	0917	IW2DAL	JN45NN	49	59					crs
0926		HA2RD	JN87WB	37	37	1				crs
0926		F5VHX	JN04FT	39	27	1				crs
0930	0934	S55AW	JN75DS	38	37	6		10		crs
0939		S53J	JN75EV	38	37	1				crs
0941	1000	S50C	JN76JG	39	27	8				crs
0952		S51MQ	JN75NT	38	39	1				crs
1007	1042	EI3GE	IO63XD	28	28	8				crs
1056	1101	G4ASR	IO81MX	39	27	4				crs
1101		G4KWQ	IO92AQ	27						ncrs
1123		DL8UCC	JO71EO	37	26	1				crs
1151	1154	OK2ZW	JN89HI	27	37	3				crs
1154		OK2BVE	JN99	26	37	1				ncrs
1202		IW2BNA	JN45ON	37	27	1				crs
1202	1206	OK2BVE	JN99	26	37					crs
1206		OK2VSO		27	26					ncrs
1218		DL5ROB	JN68HG	27	38	1				crs
1232		OM3TZZ	JN88	37	27	1				crs
1233		SP3VSC	JO92DF	38	37	1				crs
1456		HB9FAP/p	JN46EW	27	37	1				crs
1603		LZ2FO	KN13KX	37		1				ncrs *1
1960km										
1617		S52EZ	JN86DT	27	27	1				crs *1
1627		DG2KBC	JN58MI	38	27	1				crs
1651		I8MPO	JN70FP	38	27	1				120s! crs
*1 2128km										
1658		9A7D	JN95EH	39	39	1				crs
1732	1750	G0FIG	IO90UU	27	37	5				crs
1750	1800	DK3XT/p	JN49?	37	36	1				ncrs
1826		OE8HBQ	JN76KP	39	26					ncrs *1
1848		S54G	JN65TM	37	27					ncrs *1
1917		9A2SB	JN95GM	37	27	1				crs
2057	2103	G8VHI	IO92FM	27	27	3	5	8		cs
2114	2204	F4CKV	JN16NM	37	37					ncrs *2
2126		DK5TE	JN58BG	39	39	1				crs
2144		DH3IAJ	JN48HD	38	38	1				ncrs
2222	2223	OM5CM	JN98DF	28	38	2				crs
2251		DJ1OJ	JN58SE	28	27	1				crs
2252		DH0GHU	JN38VN	37	38	1				crs
2252	2259	DG3GAG	JN48NB	37	38	1				ncrs
2259	2306	9A1CAL	JN86EL	38	27					crs
2308		DG1VL	JO61VC	39	39	1				crs
2308		DK5YA	JN49NX	39	39	1				crs
2319	2318	T94DU	JN94IR	49	59	5				crs
2318		IV3NDC	JN65RV	39	29	3				crs
2319		9A4EW	JN95KG	37	38	1				crs
2319		HA4WQ		28	27	1				ncrs *2
2327		IV3GBO	JN66OA	28	26	3				crs *2
2331		HA5UK	JN97OM	49	57	1				crs
2331		S51WX	JN75OS	38	39	1				crs
2331		S51ZO	JN86DR	39	39	1				crs
2333	2338	I2FAK	JN45PB	39	39	3				crs
2339	2355	DJ5BV	JO30KI	37						ncrs
2348		S50C	JN76JG	27	37	1				crs
2351		DL5GAC	JN47UT	39	39	1				crs
2355		DL3IAE/p	JN49?	37	39	1				ncrs
2357		YU7ON	KN04AX	28	27	1				crs
2002-08-13										
0004		DL3IAE/p	JN49?	37	38	1				ncrs
0006	0017	IK1MTZ	JN35UB	39	37	5				crs
0009	0017	HA8MV	KN06HT	37	37	3				crs
0017		HB9BQU	JN37VD	38	39	1				crs
0024		DL3IAE/p	JN49?	39	38	1				crs
0048		DH8IAT	JN49GC	39	38	1				ncrs
0100		HB9DFG	JN37SM	39		1				ncrs *2
0118		IK0BZY	JN61GW	39	59	3				crs *1
1965km										
0151	0200	DB8AT	JO51DS	37						ncrs
0200	0235	IZ1BPN	JN35VG	26	37	7	14	20		c
0300	0322	I5WBE	JN53BR	47	27	m		100		c
0400	0430	OK1DRY	JN79OW							nil
0510	0525	I5YDI	JN54BB	27	37	10	6	2		cr
*3										
0655	0732	OH9NDD	KP26UM	27	37	9	23	25		cr
0800	0840	EA6VQ	JM19HN							nil
0900	0922	G4YTL	IO92MB	27	37					cs
1022	1041	DC6RN	JN59WK	37	26					crFSK
1052	1110	OK1UAK	JO70MB	27	27					ncrFSK
1111	1121	S54M	JN86	37	27					crFSK
1121	1128	DF1IAZ	JN49LD	27	37					crFSK
1134	1145	OK1UAK	JO70MB	26	37					crFSK
1151	1157	DJ5BV	JO39KI	27	26					crFSK
1202	1208	DF2ZC	JO30RN	28	37					crFSK
1215	1222	9A1CAL	JN86EL	27	26					crFSK
1225	1228	OE5KE	JN78DF	29	26					crFSK
1230	1247	DL4ANT	JN49LF	26	27					crFSK
1303	1335	IK0BZY	JN61GW	38	26					ncrFSK
1403	1422	RA3DQ	KO85US	26	27					crFSK
1450	1457	HB9SNR	JN36MQ	27	27					crFSK
1506	1517	F6FHP	IN94TR	27	27					crFSK
1524	1550	PE1GNP	JO31IX	26	27					crFSK
1554	1614	OE6IWG	JN77PK	28	27					crFSK
1743	1830	UT5JCW	KN64SN	26	27	2	2			ncrFSK
2333km										
1836	1847	9A1CCY	JN85OO	36	27					crFSK
1908	1928	IC8FAX	JN70CN	36	27		4			crFSK
2135km										
1937	1949	S53VV	JN65UM	27	28					crFSK

2003	2027	I4LCK	JN45RK	27	27				c r	FSK
2030	2047	IW2BSQ	JN45UJ	26	27				c r	FSK
2100	2122	LY2BIL	KO24PQ	38	26	2	4	8	c	
2127	2150	LY2SA	KO14LL	27	27				c r	
2200	2220	UT5DL	KN18EP	47	27	5		20	c s	
2002-08-14										
0000	0030	YU7BCL	KN05FN	26	27	11	14	6	c s	
0100	0141	G0XDI	IO91RP	27	28	m	m	6	c s	
0141	0154	G7RAU	IO90IR	28	29	3	8	3	c s	
0200	0300	SM2CEW	KP15CR						nil	
0300	0330	RV3IG	KO87OT						nil	
0400	0427	IW2DVK	JN45MQ	27	27	9	14	2	c	
0500	0515	IZ5EME	JN52NS	27	26	m	m	2	c	
1865km										
0537	0553	F1FIH	JN23GS	37	27				c r	FSK
0600	0625	F9IE	IN86WW	27	26				c s *2	
0700	0732	EA3DUY	JN12LD	26	27				c	FSK *2
1973km										

Comments:
*1 on 144,200 MHz
*2 applied wrong procedure
*3 on 144,100 MHz

Ulli DL3YEL joined me again for the trip to Lifjell. We were at 815 m asl (according to his GPS receiver) and housed in a comfortable cottage. The equipment was the same as last year (IC-821H, PA 2 x 4CX250B, 2 x 9-ele-yagi), but we set up some 70 cm gear as well (for the Nordic Activity Contest).

The Perseids were clearly weaker in 2002 than in the previous years. One reason was probably that the shower was below the horison during the predicted maximum (early evening on the 12th for Europe). It should be better next year! Perhaps the bad weather situation with major flooding in central Europe also contributed to the low activity. We did not identify a single maximum, but had particularly good periods from 07-12 UTC on August 12, and 23-04 UTC in the following night.

Nevertheless, we made many nice contacts on both SSB and HSCW, and for the first time also on FSK441. The maximum QSO distance was equal for all three modes, about 2130 km to JN70 (I8MPO, I5TWX/8 and IC8FAX). Generally, we stayed on 144,188 MHz for HSCW and SSB all the time. When working SSB, we sometimes monitored 144,200 MHz when there was no response on our frequency. Sometimes we called QRZ on 144,188 MHz in our RX period when we observed good reflections on 144,200 MHz, and attracted some stations who were standby. We even answered a few calls on 144,200 MHz but never called CQ there. Most impressive to receive I8MPO at 1650 UTC for 2 minutes (!) at 59+20dB. Lucio was surprised to hear us through "the wall of Germans" as he called it. Later in the night he again came up this strong, together with IK0BZY and IW6CVN/6.

We operated FSK441 only for a few hours in the afternoon on the 13th, when SSB and HSCW activity had gone down. We were calling CQ QSY 388 on 144,370 MHz and this worked fine. It was amazing to see how many stations were still on, and how quickly contacts were completed. Lots of garbage is received though, so that one has to receive the details several times in order to be sure they are correct. I think FSK441 is a good supplement to HSCW and SSB, however it does not appear equally exciting to me. I would not spend all the effort going on expeditions for working only FSK441 but it seems great as a "gap filler". Too bad we did not finish with UT5JCW, who we received a good burst from over a distance of 2330 km! The only sked was with EA3DUY and easily completed.

The random HSCW activity on 144,100 MHz was extremely poor. It seems that everybody who used a computer for CW keying has now moved to FSK441. One may like it or not but random HSCW appears almost dead.

QSO statistics:

Mode	HSCW	SSB	FSK
Sked	18	8	1
Random	14	52	20

This gives a total number of 113 complete contacts which probably is not bad. We had many NC contacts in SSB this time because reflections on the average did not last as long as in previous years. Also many callers did not follow the procedure what makes it difficult to complete over several bursts. I hope that some of those with a NC mark in the last column will make sure they exchange the final RRR next time. I admit it may be confusing when we call many different stations in short time, but that is the nature of working SSB MS. It is just not efficient to continue with one station when we have good bursts from many others.

As we had quite good horizon, we also worked many stations on Tropo. Among them were DG5CST and DL2ARD in JO60, DD3SP in JO72 and DL8EBW and DK5DQ in JO31.

Now I am running out of good locations in new squares in Southern Norway. Perhaps Ulli found something suitable in JO39? Who knows?

LY2SA (KO14LL) wkd on 144 MHz:

2002-08-10

0830	I4LCK	JN54RK	26	26	WSJT	1388km
1150	RA1ZC/P	KP77GU	26	26	HSCW	1605km
2100	OH8UV	KP34VJ	26	26	HSCW	1135km

2002-08-11

1104	ON4ANT	JO20AR	37	26	WSJT	1339km
1150	RA4HCN	LO43SL	27	27	WSJT	1731km
1630	S51MQ	JN75NT	27	26	WSJT	1112km

2002-08-12

0900	YO5TP	KN16SS	38	26	WSJT	858km
1310	DL1EAP	JO31BC	39	39	SSB	1189km
1412	YO4RFV	KN45AK	27	16	WSJT	1068km
1452	F1EBN	JN18JR	26	26	WSJT	1525km
1630	OH6HFX	KP14RA	27	27	HSCW	1061km
1906	LZ2FO	KN13KX	39	39	SSB	1167km
1916	LA0BY/P	JO49ML	38	38	SSB	1007km
2118	RN6BN	KN95LC	26	27	WSJT	1544km

2002-08-13

1420	DJ9CZ	JO31BC	27	27	WSJT	1189km
1720	ON4GG	JO20AR	26	26	WSJT	1339km
2145	LA0BY/P	JO49ML	27	27	HSCW	1007km

73, Vidas. Thanks for your report, Vidas.

IS0/OE6IWG (JM48HX) wkd on 144 MHz:

2002-08-24

0400	0420	DH7FB	27	27	C HSCW
0500	0515	DK3BU	27	37	C HSCW
0600	0635	DJ9YE	26	26	C HSCW
0855	0920	DG6JF/p	26	27	CR WSJT
0925	0948	S53VV	26		NC WSJT
1016	1050	DL3BUE	26	26	CR WSJT
1058	1106	DJ9CZ	26	27	CR WSJT
1115	1126	DL1RNW	26	26	CR WSJT
1130	1150	DG2KBC	26	26	CR WSJT
2037	2047	DL1EJA	28	37	CR HSCW *1
2110	2122	HB9FAP	27	27	CR HSCW *1
2155	2207	PE1HWO	27	27	CR HSCW *1

2002-08-25

0400	0500	DD3SP	26		NC HSCW
0500	0513	DF8IK	26	36	C HSCW
0519	0610	S51AT	26	26	CR HSCW
0610	0705	PA3ECU	26	27	C HSCW
1048	1056	S52LM	26		NC WSJT
1056	1102	DF2ZC	26	27	CR WSJT
1354	1426	OZ1IEP	26	26	CR WSJT
1426	1442	DD1JN	26	26	CR WSJT
1442	1504	S51MQ	26	27	CR WSJT
1502	1510	IV3HWT	26	27	CR WSJT
1514	1530	DL8GP	26	27	CR WSJT
1535	1545	DG0DG/p	26	26	C? WSJT
1900	1930	DH3VE			NIL HSCW
2030	2110	DL3YEL	27	26	CR HSCW *1
2115	2130	S51AT	27	26	CR HSCW *1
2130	2150	G4YTL	26		NC HSCW *1

2002-08-26

0942	0951	DH3VE	26		NC WSJT
1210	1222	DH3VE	26	26	CR WSJT
1240	1300	DL6ZAU	26	26	CR WSJT
1242	1310	G4ZTR	26	26	CR WSJT
1336	1354	DL5WG	26	26	CR WSJT
1400	1426	G3WZT	26	26	CR WSJT
1432	1446	PA5DD	27	27	CR WSJT
1805	1815	DL4DWA	26	26	CR WSJT
2115	2135	DL9AN	27	26	C? HSCW *1
2145	2157	HA5OV	28	37	CR HSCW *1
2227	2247	S51WX	27	27	CR HSCW *1

Cable for DTR broken, sri, no solder in my Motorhome :O(

2002-08-27

1208	1230	DK3XM	26	26	CR WSJT
1238	1255	S52LM	26	26	CR WSJT
1323	1355	IW2BSQ	26	26	CR WSJT
1355	1415	PA0ZM	26	26	CR WSJT
1415	1428	DC9YC	26	26	CR WSJT
1428	1456	G0FIG	27	26	CR WSJT
1456	1530	G4FUF	27	27	CR WSJT
1545	1604	DJ9CZ	26	26	CR WSJT
1754	1817	G4LOH	26	37	CR WSJT
1858	2000	G4YTL	26	26	CR WSJT
2104	2113	DK5TE	26	27	CR WSJT
2131	2209	OZ1LPR	26	27	CR WSJT
2209	2213	DL9AN	26	27	CR WSJT
2225	2230	OK1FFD	26	27	CR WSJT

Remarks: *1 QRM from other Callsigns.

Conclusion: Heavy QRM, so it was NOT easy to read the QSO-Partner :-(Some was working with more then 5000lpm (3000 was the max). Some sending, after my cq, the rpt + MY! call and NOT only there Callsign

IS0/OE6IWG (JN40US) wkd on 144 MHz:

2002-09-01

2000	2022	DK1KO	27	27	CR WSJT
2022	2044	DJ8ES	27	26	NC WSJT
2101	2110	DH7FB	27	27	CR WSJT
2120	2141	OZ1LPR	27	27	CR WSJT
2141	2151	DH3VE	26	26	CR WSJT
2151	2204	DL1GGT	27	27	CR WSJT
2204	2228	DL5MCG	27	27	CR WSJT
2228	2235	DG8UAW	26	27	NC WSJT
2235	2249	S51AT	27	26	NC WSJT

2002-09-02

1144	1215	DL5WG	38	26	CR WSJT
1236	1242	DK3BU	26	26	CR WSJT
1248	1258	DL6BF	26	26	CR WSJT
1744	1811	DL1RNW	26	26	CR WSJT
1811	1825	DL5WG	26	26	CR WSJT
1825	1850	DD3SP	26	27	CR WSJT
1902	1937	DF8IK	26	26	CR WSJT
1950	2008	DC9YC	26	26	NC WSJT
2012	2022	IK4PMB	55	55	NC WSJT Tropo

2002-09-03

2044	2050	DC9YC	26	26	CR WSJT
2100	2116	IM0/IK0BZY	55	55	CR WSJT

Tropo (Island Maddalena)
2130 2155 S51AT 26 26 CR WSJT
QRV with 120w (Power was often only 200VAC) and a 9el Yagi. At all 29 Locators via MS, ODX was OZ1IEP with 1892km.
My Address for direct QSLs: Walter Steinwender, H.v.Hofmannsthalweg 3, A-8605 Kapfenberg, Austria.
Thanks for your report, Walter.

PAØZM (JO32GK) wkd on 144 MHz WSJT/FSK441:

2002-05-25
0815 0837 OH6MAZ KP22WG 26 27 QTF45°
2002-06-28
1737 1738 OH1CJS KP1ØAE 26 26 QTF45° nw sqr
2002-06-29
1000 1013 OH6KTL KPØ2OJ 26 27 QTF45°
2002-07-01
0548 0558 F1FIH JN23GS 26 27 2nd QSO
2002-07-11
1704 1725 F6DHI JN23rj 26 26 QTF180°
2002-07-14
0727 0741 EA6VQ JM19HO 27 27 QTF180° 6sec
0843 0882 IC8FAX JN7ØCN 26 27 QTF163° 4sec
2002-07-15
0505 0534 S51AT JN75GW 26 27 QTF155°
2002-07-16
0554 0602 S51AT JN75GW 27 27 last b>14sec
2002-07-20
0540 0817 IK1PAG JN35SB 26 26 QTF150°
1414 1423 OH6HFX KP14RA 27 26 QTF45° nw sqr
2002-07-21
0651 0705 EA3DXU JN11CM 26 27 QTF185° 5b
2002-07-22
1244 1302 F1FIH JN23GS 26 27 3rd QSO
1423 1446 SM1A JO97FK 26 27 QTF55°
2002-07-24
0542 0624 S53VV JN65UM 27 26 QTF155°
2002-07-25
0657 0714 SM3JLA JP93LH 26 26 QTF45°
2002-07-27
0553 0631 ES1RF KO29IJ 26 26 QTF80°
2002-07-29
1344 1359 IV3KTY JN65QQ 37 37 QTF150°
2002-08-01
1804 1818 LY2BIL KO24PQ 26 26 QTF80°
2002-08-02
1942 1950 LY2SA KO14LL 37 27 1st burst >15sec
2002-08-03
0817 0828 LA8KV JP52QQ 27 27 QTF25° nw sqr
2002-08-06
0849 0853 ES8X KO18 37 27 not conf.?
1126 1140 RU1AA KP40XD 36 27 3d QSO
2002-08-07
1619 1636 RW3AZ/1 KO55JR 27 27
2002-08-09
0854 0914 SM3VAC JP83VA 26 26 QTF45° nw sqr
1123 1144 RX1AS KO59FX 26 27 QTF58° nw sqr
2002-08-10
0619 0631 ES1RF/3 KO29IF 27 27
0654 0724 S51WX JN86 26 26
2002-08-11
0716 0809 SM2CEW KP15CR 38 39
2002-08-12
1345 OH7PI KP32XG 27 27
2002-08-15
1000 1008 EA3DUY JN12LD 27 27 QTF180° nw sqr
1158 1209 YU7KB JN94XX 26 26
1411 1436 9A1CAL JN86FJ 26 27
2002-08-18
0928 0951 OH1JCS KP1ØAE 27 27 2nd QSO
2002-08-27
1358 1414 IS0/OE6IWG JM48 26 26 nw DXCC+sqr
2002-08-31
0846 0922 LA6QBA JP61BJ 26 27
1346 1413 I6BQI JN72BK 27 27
2002-09-07
0615 0625 F1JG JN23HQ 26 26
2002-09-15
0737 0812 OE6IWG JN77PK 27 28
2002-09-18
1755 F1JG JN23HQ 26 26 2nd QSO
2002-09-20
1842 1901 EW6FS KO35LB 26 26
73, Geert - Silent key!
My friend and former colleague Geert, PA0ZM passed away of cancer on September 29 2002. Unfortunately there will be no PA0ZM results anymore in the future DUBUS lists. 73, Abraham, PB0AOK.

PE1HWO (JO21GV) on 144MHz via MS:

2002-01-03
1240 RK1B KO49WN 27 27 MFSK 1785km
1328 IK4DCX JN64GA 27 27 SSB 1058km
2238 OH1HSC KP10CM 27 27 MFSK 1446km
2002-01-04
0052 I8MPO JN70FP 27 27 SSB 1462km
2002-04-15
0617 EM5U KN39LJ 27 27 CW 1598km
2002-04-19
0737 EM5U KN49KA 27 26 CW 1743km
2002-04-22
0511 EM5U KN48KN 29 26 CW 1761km
2002-04-24
2308 S51AT JN75GW 27 27 MFSK 985km
2002-05-09
0000 SP/DH7FB KO13CW 27 27 CW 1203km
2002-05-10
2337 SP/DH7FB KO13CW 27 27 MFSK 1203km
2002-06-03
0031 F/PA5MS IN77UV 27 28 CW 773km
2002-06-05
0740 LY2AAM KO23DX 28 38 CW 1339km
2002-06-09

2322 SO4TEC KO13CW 29 27 CW 1203km
2002-06-16
0539 OH1/DL5ME KP00UD 27 26 CW 1400km
2002-07-29
2337 LA/DJ8ES/P JP21PI 26 26 MFSK 1053km
2002-08-02
0300 OH/PA3BIY KP27KS CW NC *1
2002-08-03
0827 SM3/DL1RNW JP72LC 27 27 MFSK 1295km *2
1013 HA2VH JN87WG 27 26 MFSK 1088km 80W
2002-08-05
2319 OH8NXE KP25SB 26 26 MFSK 1888km
2002-08-07
2210 SM2CEW KP15CR 28 28 MFSK 1830km 12sec 80W
2259 RW3AZ/1 KO55JR 27 27 MFSK 1764km
2002-08-08
2257 SP3VSC JO92DF 27 27 MFSK 939km
2002-08-10
2153 SP7JSG KO01BW 27 27 MFSK 1070km NC
2002-08-11
0255 HA5KDQ JN97LN 28 27 MFSK 1140km
0300 UT5JCW KN64SN MFSK 2285 NC
2121 OH3KJL KP21PI 27 27 MFSK 1636km
2002-08-12
0050 I4XCC JN63GV 37 37 SSB 1070km
0056 I8MPO JN70FP 27 27 SSB 1462km
0100 OH8K KP45CB CW NC *3
0235 LA0BY/P JO49ML 27 28 CW 889km
0407 IK1YWB JN34NO 27 27 MFSK 833km
0423 SM7IWG JO77IP 27 37 MFSK 911km
0445 OM5CM KN09 27 SLOW CW NC
0600 OH8K KP45CB CW NC
1000 SM/PA3BIY KP17 CW QRT *4
1652 SP1HOP JO83 59 59 SSB 860km
1839 LY2BAW KO25KA 27 27 MFSK 1385km
2300 HA5OV JN97NJ 27 27 SSB 1160km
2354 SM3JLA JP93LH 27 37 MFSK 1525km
2002-08-13
0141 YU1BT KN03KN 27 27 SSB 1528km
0151 HA0MK KN08TA 27 27 SSB 1292km
0206 S50C JN76JG 27 27 SSB 972km
0240 HA8MV KN06GU 39 39 SSB 1283km
0300 SM/PA3BIY KP17 CW NC 2b 1p
1552 9A1CCY JN85PO 27 27 MFSK 1165km
2002-08-17
0535 SM/PA3BIY JP72 27 27 CW 1336km
2002-08-22
0445 SM/DL9MS KP06CL 27 26 CW 1839km
2002-08-24
2215 IS0/OE6IWG JM48HK 27 27 CW 1530km
2002-10-01
2034 G0KZG/mm IN39 27 26 MFSK 1257km
2002-10-08
2220 IW3BKQ JN56NH 26 27 MFSK 915km 10W FB
2238 S51AT JN75GW 27 27 MFSK 985km
2002-10-15
2019 G0KZG/mm IN39 26 26 MFSK 1257km
2113 IW2BSQ JN45UJ 26 26 MFSK 816km
2002-10-16
2248 OH7UV KP33 27 26 CW 1841km
Remarks: *1 mni qrm vy short reflx; *2 over S7 QRM; *3 got 56sec burst, OH8K didn't hear me due AU; *4 vy poor reflx and needed sleep badly. Perseids were much less active then last year. Reflection were to short so not much fun on SSB random. No real peak noticed. Also most long QRB qso's failed due lack of proper reflections. Further we could all "see" a major shift in meteor-scatter activity from HSCW to WSJT. 73, André - pe1hwo@amsat.org - www.qsl.net/pe1hwo. Thanks for your report, André.

RW3AZ/1 (KO55JR) wkd on 144 MHz WSJT (FSK441, all random):

2002-08-04
1410 DK1KO JO53CT 37 27 1334km
1430 DG0KW 37 37
2002-08-05
2057 DL3BUE 26 27
2117 DG6JF/P JO33QF 26 27 1533km
2150 DD3SP JO72EN 37 37 1124km
2210 DJ5BV 26 27
2210 DJ7OF JO51HQ 27 27 1397km
2243 DL5WG 26 37
2002-08-06
1204 HA8CE 26 27
1320 ON7CL 27 27 no RRR
1610 DJ8ES JO43 36 27
1647 DK1KO JO53CT 27 27 1334km
1946 DH0AAI 27 27
1951 DF2ZC 27 37
2022 DM1HD 27 27
2059 DL1JJ 27 27 no RRR
2150 DL7FF JO63TJ 27 27 1135km
2154 OE6IWG 27 27
2200 DC9YC 26 27
2250 DG9BEM 26 27
2259 DJ8MS JO63AR 27 28 1135km
2002-08-07
0748 DG0KW JO64MI 27 27 1140km
1025 DL4DWA JO61QH 27 27 1249km
1100 DG2SRL JO61HO 27 27 1279km
1550 SP3VSC 27 27
1600 DJ9YE JO43MM 26 37 1418km
1638 PA0ZM JO32GK 27 27 1617km
1755 DG3GAG JN48NB 26 27 no RRR 1705km
1800 DL5ROB 27 27
1913 9A1CMS JN86EL 27 26 1535km
1938 PA9RX JO32MT 27 27 1570km
1948 DL9AN 27 27
2010 DH7FB 27 27
2052 PA0BAT JO32JF 27 37 1610km
2120 DL6ZAU 27 27 no RRR
2140 OZ2TF JO46PE 37 37 1336km
2235 OK2ZAW 27 27 no RRR

2259	PE1HWO		27	27	
2002-08-08					
2021	OE6IWG		28	27	
2100	DK3XM		26	27	
2002-08-09					
0630	PA1GYS	JO22WW	27	27	1638km
0825	DG1VB	JO61RC	26	27	1256km
0918	DJ5HG		27	27	
2002-08-10					
1840	DG2DAA		28	28	no RRR
2008	OM3TZZ		27	27	
2016	9A1CAL		27	27	
2100	DD1JN		27	27	
2150	OK1MDK	JN79PX	26	27	1219km
2155	OK1KF	JO70	28	27	
2220	DG0DG/P	JO61SA	26	27	1256km
2250	OK2BRD	JN99ET	27	27	1062km
2305	S51MQ	JN75NT	27	27	1553km
2002-08-11					
0012	OK1UAK	JO70MB	27	27	1228km
0015	OK1ZW	JN89HI	27	27	1190km
0028	I4XCC	JN63GV	27	27	1847km
0108	OK1FFD	JO60KH	27	27	1338km
0037	DL5GAC		27		NC
0150	OE6IWG		26	27	
0200	PE1GNP		27	27	
0225	UT5JCW	KN64SN	27	27	1258km

Thanks to Nick (RA3DRC/1) and his wife Valentina for shack and hospitality! Thanks to Mike (UA1WCF) and Alex (UA1XP) for technical support! Special thanks to Vladimir (RA3ABZ) for delivery my body there and back to Moscow and every hour cup of coffee! Thanks to all for many interesting contacts!
Alex, RW3AZ. - Alexander Skouridin - rw3az@online.ru.
Thanks for your report, Alex.

LAST MINUTE INFO:
Leonids 2002:
Transatlantic 2m Attempt

A German group of radio amateurs is going to be qrv during Leonides in November 2002 from both sides of the Atlantic ocean.
Harry, DL2DAO, joins a group of Canadian radio amateurs (head is Paul, VO1HE) at Cabot Tower / Newfoundland (Loc.: GN37) while Volker, DL5DAW, and Nico, DK5DQ, will travel to southwest Ireland to set up their rig in IO41 or IO42 square. Central aim is to cross the North Atlantic (QRB ca. 3030km) on 144 MHz in meteorscatter using FSK441 mode during the expected peaks with meteor-storm conditions on November 19th.
Before and after this event both stations are available for "local" meteorscatter.
Info de Nico, DK5DQ, Oct 25th 2002

Sporadic E
144 MHz – Reports 2002
Editor: Norbert Göttsche
DL8LAQ@gmx.de

Dear Readers, please send your reports via email to dl8laq@gmx.de or packet radio to DL8LAQ @ DB0HB.#HH.DEU.EU. 73, Norbert
All QSOs in UTC!

DK6AS (JO52JJ) wkd:
2002-06-02
1338 IW9ELR JM68PD, 1344 IT9KSS JM68QC, 1408 EA6FB JM08PV, 1409 EA3DXU JN11CM, 1411 EA5/DJ4UF JM08BR, 1419 EA6/DF9UX JM09RA, 1427 EA5EZJ IM98VX.
2002-08-11
1233 EA9IB IM85NG, 1303 CT1FAK IN50QO, 1309 CT1EEB IN50RR, 1311 EB1EDK, 1313 EB1DNK IN62.
Vy 73, Andreas - DK6AS@darc.de.

G4LOH (IO94IA) wkd:
2002-06-01

1707	LZ1KWT	KN32AS	59 59 #	2353km
1709	YO7BKT	KN25MG	59 59 #	
1710	YO7HMH	KN25MG	59 59	
1712	YO3DMU	KN34BJ	59 59 #	
1713	LZ2PI	KN23XU	59 59 #	
1714	LZ2PB	KN33GM	59 59 #	2329km
1729	YU7EW	KN05HP	59 59	

Five new squares in 1/2 hour fb!
2002-06-02

1307	I8MPO	JN70	59 59	
1348	IZ8DPL	JN70FU	59 59	
1351	IW0BET	JN61	59 59	
1352	IW0GPN	JN62FB	59 59	#
1354	IK8YOQ	JN70GR	59 59	
1358	I0JX	JN61GW	59 59	
1402	IK0SME	JN61FW	59 59	
1404	IK1SOI	JN62HN	59 59	
1405	IK0PEA	JN61GV	59 59	
1413	IK0DBO	JN61NQ	59 59	
1414	IC8CQF	JN70CN	59 59	
1415	I8MIB	JM88AQ	59 59	# 2150km
1419	IZ8DWL	JM88BR	59 59	
1419	IK8YVG	JM88BR	59 59	
1421	I8YGZ	JN70	59 59	
1424	IK8XSY	JN70VB	59 59	
1426	IC8FAX	JN70	59 59	
1436	I7UGO/7	JN80WG	59 59	
1749	9A2RD	JN65TF	59 59	

2002-06-03

1432	CT1HZE	IM57NH	59 59	#

2002-06-08

1032	CN2DX	IM63DM	55 59	2334km fb!

Thanks new DXCC and #. Regards, Tim. G4LOH.
Thanks for your report, Tim.

GU6AJE/MM (JM84) wkd:

2002-06-02

1254	PA5DD	JO22	59	59	
1254	G4SWX	JO02	59	59	
1255	PA0JMV	JO21	59	59	
1256	DL1KDA	JO30	59	59	
1256	ON6ZK	JO20	59	59	
1256	ON4AMX	JO20	59	59	
1257	DL4VS	JN39	59	59	
1257	PA0CIS	JO22	59	59	
1258	DH3VE	JN59	59	59	
1258	DH0GHU	JN38	59	57	
1259	PA3BIY	JO22	59	59	
1300	ON4LN	JO20	59	59	
1301	IT9IMJ	JM77	59	59	TROPO
1301	DL8EBW	JO31	59	55	
1302	PI4CRK/P	JO22	59	59	
1304	DB2KA	JO30	59	59	
1305	DF7KF	JO30	59	59	
1305	DF2ZC	JO30	59	59	
1306	HB9DDS	JN47	59	59	
1306	IT9XDJ	JM77	59	59	TROPO
1307	DK9TF	JO31	59	59	
1308	PA0WWM	JO22	59	59	
1309	DF1BN	JO31	59	59	
1309	DF8IK	JO30	57	54	
1310	DF2JQ	JO31	59	57	
1310	DL2OM	JO30	59	59	
1310	9H1PA	JM75	59	59	TROPO
1311	DL1GBM	JN48	59	59	
1312	DH5HV	JO31	55	57	
1312	DG3GAG	JN48	59	59	
1313	PA3CMC	JO21	59	59	
1313	PA0PVW	JO22	59	59	
1314	DK3RV	JO31	59	59	
1315	PE1HWO	JO21	57	59	
1316	DC5JQ	JO31	59	59	
1316	PA0AOL	JO21	59	59	
1317	PI4SRA/P	JO22	59	59	
1318	9H1GB	JM75	57	57	TROPO
1319	PA3DOL	JO22	59	59	
1320	DG5YIL	JO32	59	59	
1321	DK5DQ	JO31	59	59	
1321	DH2DAM	JO31	59	59	
1322	PE9GG	JO31	56	52	
1323	DK5YA	JN49	59	57	
1324	PE1GNP	JO31	59	57	
1324	DL9GS	JO31	59	57	
1324	DG1KJG	JO30	59	59	
1326	PE9DX		57	53	
1327	PA5TA	JO33	59	59	
1330	PD1ANQ	JO31	59	59	
1330	DH3YAK	JO31	59	59	
1331	DF6WE	JO31	59	57	
1332	PI4KOD	JO32	59	59	
1332	PE9GG	JO33	59	52	
1333	IT9RYJ	JM77	57	55	TROPO
1334	PA9RX	JO32	57	59	
1334	PD0RFU	JO32	59	59	
1335	DK1CM	JO40	59	53	

Rig: IC706, 10W, Discone. 73, Mike.
Mike, GU6AJE, has finished is job on the Greenpeace ship "Esmeralda" in the end of July.
He went back to GU and has moved recently to England (IO82). Mike may become a new job on another ship in February 2003.

I4XCC (JN63GV) wkd on 144 MHz:

2002-06-03

0811	G7RAU	IO90IR	59	59
0812	MW0AXA	IO81	59	59
1731	EI4IX	IO53HV	59	59

2002-06-08

1400	CT1EPS	IM57XI	59	59

2002-06-10

1724	YO4BZC	KN45AK	59	59
1725	YO4ATW	KN35XG	59	59
1726	RZ6BU	KN84PV	59	59
1727	UU4JKE	KN65QE	59	59
1728	YO4RDK	KN35WK	59	59
1732	YO/ER1BL	KN45AK	59	59
1741	YO4KBJ	KN45AK	59	59
1744	UT5JCL	KN64SN	59	59
1750	UA6BHM	KN84PV	55	55
1744	UY5HF	KN66HP	59	59
1758	UR5GK	KN66KC	59	59
1802	UT5JCW	KN64RO	59	59

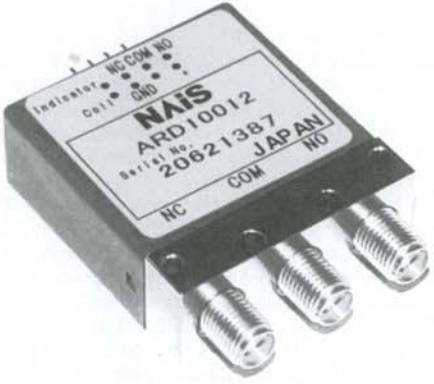
Thanks for your report, Claudio.

New Products

Editor: Joachim Kraft, DL8HCZ

GHz-Relais

Neu bei UKW-Berichte gibt es ein GHz-Relais von NAIS mit SMA-Anschlüssen und 12 Volt Spulenspannung. Die Standardausführung des Kleinleistungsrelais geht bis 18 GHz bei einer Einfügedämpfung von 0,5 dB; eine weitere Ausführung ist sogar bis 26 GHz einsetzbar.



Die Isolation zwischen beiden Anschlußports liegt bei 18 GHz bei beachtlichen 60 dB.
Die übertragbare Leistung wird mit 120 Watt bei 3 GHz angegeben. Das Relais ist 34 mm breit, 13 mm tief, 38 mm hoch und wiegt 41 Gramm.
Das GHz-Relais mit der Art.Nr.: 04090 ist zum Preis von EUR 178.- zu beziehen bei:
UKW-Berichte, Fachversand für Funkzubehör, Eberhard L. Smolka, Jahnstr. 7, D-91083 Baiersdorf, Tel. 0049 9133-77980, Fax 0049 9133 779833 eMail: ukwberichte@aol.com
www.ukw-berichte.de

CQ DL Spezial "6m – The Magic Band"

"6m - The Magic Band" ist eine weitere Ausgabe CQ DL Spezial. Sie ist jetzt im DARC Verlag erschienen. Dieses Sonderheft ist nicht nur für 6-m-Spezialisten, sondern für alle, die mehr wissen wollen über Ausbreitungsphänomene, Selbstbau von Antennen und Konvertern usw.
Das Heft umfasst 112 Seiten, fast die Hälfte der Artikel sind extra für dieses CQ DL Spezial neu geschrieben, von 33 Autoren aus 8 Ländern.
Der Verkaufspreis beträgt 6.80 Euro.
Mehr unter http://www.darcverlag.de/

New available from DARC Verlag in Germany is a special 6m issue from CQ DL magazine. This issue has 112 pages. Half of the articles is new the other half taken from cq-DL magazine.
Selling price in DL is 6.80 Euro.
More info you can find on the websites of the company: www.darcverlag.de

News & Comments

Editor: Klaus Tiedemann, DL4EBY
tklaus@snafu.de

LinWSJT: JT44 und FSK441 für Linux

G4KLX, Jonathan, ist zur Zeit dabei , die bekannte Software WSJT von K1JT für Linux umzuschreiben. WSJT ist ein bei UKW-DXern weit verbreitetes Programm, das DX-QSOs via EME, Meteor-Scatter und Tropo-Scatter bei Signalen ermöglicht, die unter dem Rauschen liegen.
G4KLX hat sein Programm unter der vorläufigen Bezeichnung LinWSJT 0.3 jetzt kostenlos im Internet zum Download bereit gestellet. (Adresse: www.qsl.net.g4klx) In der vorliegenden Version kann das Programm JT44 senden und empfangen. Im FSK441 - Modus kann bisher nur gesendet werden. Jonathan ist dabei, die Software weiter zu entwickeln, so dass auch in FSK441 empfangen werden kann. Auch am GUI (Graphical User Interface) werden noch Verbesserungen vorgenommen.

LinWSJT: JT44 and FSK441 for Linux

G4KLX, Jonathan is currently working on a Linux version of the K1JT's well known WSJT. WSJT enables digital DX QSOs via EME, Meteor Scatter and Tropo Scatter with signals below the noise. G4KLX now offers his program called LinWSJT 0.3 on the Internet at www.qsl.net.g4klx.
The current version is able to receive and transmit JT44. At present, FSK441 is functional for transmit, only.
Jonathan continues his efforts on the program in order to make it receive FSK441 as well. Other improvements include a better GUI.

YO2 beacons QRT

On 01 October 2002 all beacons located in KN05ps, YO2X (10 & 2m) YO2S (6m) and YO2U (70 & 23cm) at the YO2KAC club went QRT.
Thanks to all who send reception reports and to those who did support our beacon program. Lets hope the future will create new and may be better opportunities to run again some local beacon projects. 73 & DX, Szigy, YO2IS

OH2VHF is on the air again!

At the moment the OH2VHF beacon runs a test transmission from OH7TE`s home QTH in KP20IE.
Freq: 144.443 MHz ±10 Hz, pwr: 3 or 40 W, ant 15 el 40m asl, direction SW. If aurora condx, QTF N. Any comments about signal, keying etc are welcome via e-mail:
juhani.tuovinen@nokia.com or oh7te@sral.fi

New beacon GB3MHS

We have just brought a new 3.4GHz beacon into operation, callsign GB3MHS. The details are:

Callsign	GB3MHS
Frequency	3400.830MHz
Locator	JO02PB
Power	75W ERP
Antenna	14dBi Slotted line x 2
QTF	W/E
ASL	85m
Mode	F1A

We have also upgraded **GB3MHX** on 10368.830 GHz from 1 to 5 W ERP now. 73s, John G3XDY Beacon Keeper for GB3MH* beacons

ATV über den Mond

Henry Ruh, AA9XW (ex KB9FO/WB9WWM), wollte im September Tests via EME-ATV auf 434 MHz (AM-ATV) mit 1 Megawatt ERP und einer kommerziellen Richtantenne durchführen. Leider hat sich bis Anfang Oktober keine daran interessierte Gegenstation gefunden.
Schon 1970 wurden mit großen Antennen die TV-Signale von kommerziellen UHF-Stationen über Reflektion an der Mondoberfläche empfangen, wenn der Mond am Horizont aufging und in die horizontale Richtkeule der Sender kam.
Es müssen aber sehr schmalbandige Empfänger benutzt werden (ca. 100 KHz), und die Sendestation muss bildgroße Zeichen senden (geringe Bandbreite). Wer Interesse an diesen Versuchen hat, kann Henry per Email erreichen: A9XW@cs.com

ATV via the moon

Henry Ruh, AA9XW (ex KB9FO/WB9WWM), planned testsvia EME ATV on 434 MHz with 1 MW ERP and a commercial antenna, in September. Unfortunately, no one was found with interest in tests, until October.
Already 1970 signals from (commercial) UHF TV stations were received from reflectors on the moon surface, if rising moon was within the horizontal pattern of the transmitters.
Very small bandwidth receivers (about 100kHz) must be used and the image must contain screen filling letters, because of the small bandwidth. If anybody is interested to conduct such tests please contact Henry per Email: A9XW@cs.com

W3ZZ new World Above 50 MHz editor

A venerable QST institution is getting a new editor. Starting with the December issue, Gene Zimmerman, W3ZZ, of Gaithersburg, Maryland, will take over the reins of "The World Above 50 MHz" from Emil Pocock, W3EP, who has handled the column for the past 10 years.
"The VHF and above area has been an interest of mine since I was first licensed," says Zimmerman,

a ham since 1956.
Among other accomplishments, Zimmerman has logged several national top-10 finishes in the ARRL November Sweepstakes (both modes) as well as a
second-place North American finish in the CQ World Wide CW event (from VP2MDD). He's also bagged several national top-10 finishes in ARRL VHF parties and in the ARRL VHF Sweepstakes.
After his forays into HF DXing and contesting, Zimmerman returned to VHF in the early 1980s. Operating from his home in Maryland, he's progressed to a setup that covers 6 meters through 70 cm with full legal limit amps plus gear for 903 MHz through 10 GHz--"when it all works," he quips.
Even in "the world above 50 MHz," Zimmerman says he's more of a DXer than a contester. He holds VUCC on 50 through 1296 MHz with more than 800 grids confirmed on 6 meters alone and 250 on 2 meters. He's also a frequent participant on the VHF convention scene.
A Life Member of ARRL, Zimmerman has served on the ARRL Contest Advisory Committee, edited the VHF contesting column for CQ Contest magazine during its five-year lifespan and was director from 2000 until 2002 of the CQ VHF Contest.
QST Editor Steve Ford, WB8IMY, credited Pocock, the retiring editor, with popularizing VHF operating for the non-VHF community. "Emil used his column as a forum to encourage interest among beginners," Ford said. He also broadened the column's scope to embrace activities not often described in the amateur press and described propagation phenomena in a way that all hams could understand, he added. (ARRL-Newsline)

VHF & MS database Rev 1.90

Dear VHF-friends, the new issue of the VHF-DATABASE (revision 1.90) and of the MS-DATABASE (revision 1.90) are now ready to spread out!
The MS-DATABASE files (ms190.zip as well as ms190_wsjt.zip) are free of charge to download at: http://www.rue.net/vhfdx/services/services.htm or http://www.meteorscatter.net/traf.htm (its only an extract of the big VHF-DATABASE and these file is not to use in EA6VQ-Log, OH6HFX Logbook or DX-Cluster!!)
VHF-DATABASE 1.90 for User: The VHF-DATABASE (vhf190_user.zip) for use in programs like EA6VQ-Log OH6HFX or any spread-sheet (as Excel) will be available if you send in 5 EUR or 5 US$ together with your Emailadress to:
DL8EBW, Guido Juenkersfeld, c/o VHF-DX-Group DL-West, PR-BBS: DB0NDK.#NRW.DEU.EU or DX-Cluster: DB0MDX or DB0NOR-9 Email: dl8ebw@darc.de The file will be send out after receiving your payment.
VHF-DATABASE 1.90 for DX-Cluster-Sysops:
The VHF-DATABASE (vhf190_clx.zip and vhf190_ak1a.zip) are only for use in the DX-Clusters (Typ CLX, AK1A, SPIDER etc.) and will be given out free of charge to every cluster sysop.
Please so send me the cluster-call, sysop-call, type of Clusters and the EMail address and I will pass you the special files in comming days. Your request/info will be welcome at DL8EBW.
Details of all available databases can be found at: http://www.rue.net/vhfdx/services
A lot of fun with the new issue of the VHF-DATABASE! 73 de DL8EBW, Guy, c/o VHF-DX-Group DL-West

G0KZG/mm qrv Nov - Dec 2002

G0KZG/MM will be sailing from Scotland (Glasgow) on Nov 6th up to a working area southwest of Iceland, returning to Southampton / England on about the 21st Dec 2002.
There will be a 2 days stop in Reykjavik (TF). Andy runs his usual high power 2m station.
Equipment will be: FT 847, 3CX800 Linear, 11 ele F9FT for 2m, low noise masthead pre amp., station fully equipped for HSMS using WSJT & "standard" HSCW.
Sked-QRG: 144.120 CW-MS mostly 04-07z, Random 144.125, WSJT 144.360 mostly 18-21z, during weekends also qrv in the afternoon.
Infos/skeds : Andy, G0KZG, g0kzg@aol.com

JN10, JN20, JM29: EA6/DL1GGT, DL1SAN und DL6SAQ sind vom 17.-22.11. auf 2m via SSB, CW und WSJT-MS qrv. Am 19.11. morgens gleichzeitig aus allen 3 Feldern. Skeds im VHF-Netz 14345kc.
EA6/DL1GGT, DL1SAN and DL6SAQ will be QRV from Nov. 17-22nd 2002 on 2m via SSB, CW and WSJT_MS. The 19th in the morning from all three squares at the same time. Skeds on the VHF-Net 14.345 MHz.

KP24: OH6HFX etc will be qrv during the Leonides (17.-19.11.) on 2m via CW-MS+WSJT (144.172) and SSB-MS (144.224 MHz) with 350 Watts and 12 Ele. Skeds: oh6hfx@sral.fi

KP55: OH6JW+ZZ etc. will be qrv during Leonids (17.-19.11.) as OH8K on 2m via CW-MS (144.147) and SSB-MS (144.218 MHz) with 2 x 16 Ele + EME-Power. May be also WSJT. Skeds: oh6jw@sral.fi

Redaktionsschluss für Aktivitätsberichte und redaktionelle Beiträge für DUBUS 4/2002 ist der 20. Dezember 2002.
Deadline for reports etc. for DUBUS 4/2002 is December 20th 2002

DUBUS Poll - 2002

Wir möchten an dieser Stelle alle Leser des DUBUS Magazins nach ihrer Meinung zum Inhalt und Umfang des Heftes befragen, damit wir in Zukunft besser wissen, was wirklich gedruckt werden soll und was nicht.
In Zeiten von Email, Internet, Convers und Clustern ist es seit einiger Zeit schwer abzuschätzen, ob das Erscheinen einer gedruckten Zeitschrift überhaupt noch gewünscht wird.
Mit anderen Worten: Es geht hier um die Zukunft und das Fortbestehen des DUBUS-Magazins!
Und es gibt jetzt die Chance für jeden, seine Ideen und Kritik zu äußern.
Wir hoffen, dass davon rege Gebrauch gemacht werden wird. Die Antworten können an uns per Post, FAX oder email geschickt werden.
Auch auf der DUBUS-Webseite findet sich ein Formular, das dafür verwendet werden kann.
Die persönlichen Angaben (Name, Call, Alter) sind natürlich freiwillig und können auch weggelassen werden.
Wir bitten, uns die Umfrage bis spätestens zum
15. Dezember 2002
zurückzusenden, damit wir das Ergebnis schon für das nächste Heft auswerten können.
Unter allen Einsendern werden wir 10 Freiabos für das Jahr 2002 verlosen.
Vielen Dank für Ihre Mithilfe!

We would like to ask all our readers some questions regarding content, size etc of DUBUS magazine. With your help we will know better what to print or not to print in the future.
In these times of email, internet, cluster and convers it is even a question if anyone still wishes to have a printed magazine like DUBUS.
In other words: We all have to decide about the future of DUBUS now!
Everybody has now the chance to say your opinon and to criticize us.
We really hope for MANY answers from you!
You can either mail, fax or email us.
You will find the questions also on the DUBUS website, so you can make a printout or paste and copy into an email.
Your personal data are voluntary, of course!
We ask to send us your answers
BEFORE DECEMBER 15th 2002
because we want to use the results for the next issue 4/2002.
Among all participants we will raffle 10 subscriptions for 2003.
Many thanks for taking part!

Vy 73
Joachim Kraft, DL8HCZ

Leserumfrage 2002

FRAGEN / QUESTIONS

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

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

YES NO

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

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

YES NO

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

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

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

YES NO

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):

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, 3cm,

1.5cm, higher microwaves, Laser, HF

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.

- Technik (Bauanleitungen / Construction)
- Technische Tipps / Technical Hints & Kinks
- Ausbreitung / Propagation
- Betriebstechnik / Operating Technique
- Neue Produkte / New Products
- Microwave Parts
- Microwave Europe
- „Microwave USA
- EME-News
- Tropo-Berichte / Reports
- 6m-News + Berichte / Reports
- FAI-Berichte / Reports
- Baken + Bakenliste / Beacons + Beaconlists
- Aurora-Berichte / Reports
- Meteor-Scatter-Berichte / Reports
- WSJT / FSK – Berichte / Reports
- Sporadic-E-Berichte / Reports
- Toplisten / Toplists
- News + Comments
- EME-Conteste
- andere/other VHF/UHF/SHF-Conteste
- Contestkalender / Contest Calendar
- Meteoritenschauer-Kalender / MS-Calendar
- Lasertechnik + QSOs
- Software für / for VHF/UHF/SHF-DX
- Quellen im Internet / Internet sources
- Fotos von Antennen / Stationen / OPs
  Pictures of antennas, stations, OPs
- Nicht-Schmalband-Technik (z.B. ATV) /
  Non narrowband techniques (e.g. ATV)

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?

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?

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?

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?

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

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?

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

18.) Ihre Daten / Your data?
Name

Call

Age / Alter

email-Address

Diese Angaben sind freiwillig und werden von uns vertraulich behandelt und nicht weitergegeben!
These are voluntary data. They will not be given to anyone else!

Please send to / Bitte einsenden an:
DUBUS, Guetzmuehlenweg 23,
D-22339 Hamburg, Germany
FAX: ++49 40 5383186
Email: info@DUBUS.de www.dubus.org

DUBUS Toplist

Editor: Norbert Goettsche, DL8LAQ

50 MHz Toplist

NR	Call	WW Loc	Wkd Sqr	DXCC	Tropo	Aurora	MS	Es	(ODX) F2
1	ON4ANT	JO20	1151	212	1180	1952	1975	9007	16802
2	ON4GG	JO20	1100	213	813	1757	1695	8317	16727
3	VE1YX	FN74	1082	167	0	0	0	0	0
4	DL7QY	JN59	1055	204	741	1665	2186	0	27926
5	SM7FJE	JO65	1057	198	0	0	0	0	0
6	PY5CC	GG54	1032	215	0	0	0	0	0
7	IK0FTA	JN61	1003	209	0	0	0	0	0
8	PA0HIP	JO21	1002	204	0	0	0	0	0
9	SM7AED	JO65	982	190	0	0	0	0	0
10	PA0RDY	JO22	973	181	750	1617	1597	0	16320
11	G4IGO	IO80	958	195	578	1308	2528	7301	16188
12	G3WOS	IO91	905	203	0	0	0	0	0
13	G4UPS	IO80	902	182	0	0	0	0	0
14	ON4KST	JO20	856	163	801	1415	1509	8374	16498
15	DL7AV	JN58	856	191	0	0	0	0	0
16	SV1DH	KM17	840	217	0	0	0	0	0
17	OK1DDO	JO60	802	161	620	1423	1340	6100	16266
18	F8OP	JN26	793	141	631	1023	1369	5508	13547
19	ON4PS	JO20	791	155	752	1740	1902	6520	16358
20	SM6CMU	JO57	790	169	762	1452	1642	5922	0
21	PA2VST	JO22	764	155	0	0	0	0	0
22	GJ4ICD	IN89	758	167	0	0	0	0	0
23	DL8HCZ	JO53	758	115	365	1250	1356	3350	0
24	DL3AMA	JO51	734	148	519	1431	1600	4001	14810
25	SP4MPB	KO03	722	164	710	1836	1507	8290	17521
26	PA2TAB	JO32	659	152	857	1370	1809	5797	15339
27	SP6GWB/P	JO80	657	139	696	1774	1880	8583	17887
28	OK1FFD	JO60	654	148	580	1231	1380	7450	14773
29	OK2ZW	JN89	618	138	1681	0	0	0	15580
30	IK5JWQ	JN52	616	151	820	0	1485	5908	15237
31	F5DE	JN05	608	142	860	704	1368	3638	15789
32	PE1HWO	JO21	606	129	835	1671	1674	6061	11443
33	SP6MLK/P	JO80	593	122	1051	1607	1505	8557	27874
34	YL3AG	KO26	591	131	691	1817	0	8115	14305
35	DF7RG	JN68	581	122	652	1576	824	4864	14802
36	DL7HG	JO62	568	115	0	0	0	0	15600
37	IZ5EME	JN52	567	122	583	0	1712	5216	15152
38	OK1KT	JO70	561	121	0	1545	1486	4377	15999
39	I4XCC	JN63	548	0	707	0	1427	4456	18627
40	DL2DR	JO31	530	108	1003	0	0	4769	12047
41	SP6GZZ	JO81	529	0	515	1394	1826	8103	14443
42	OK1VBN	JN78	512	92	455	1496	897	8790	14645
43	ES1CW	KO29	503	104	959	1968	2116	6337	13090
44	DL6NCI	JO50	503	132	708	1294	505	7815	14239
45	DJ6MB	JO30	503	114	0	1058	0	2685	13285
46	YO2IS	KN05	465	109	412	1253	1404	7775	15931
47	ES2RJ	KO29	458	88	971	1923	2052	4642	13682
48	ON1IM	JO11	456	106	223	1278	1302	5607	16205
49	IW1AZJ	JN35	450	120	445	800	1341	3221	15261
50	OK1FAV	JO60	444	96	0	579	1093	6250	12924
51	ES2WX	KO29	443	85	562	1924	1847	4651	13682
52	ES1AJ	KO29	439	94	415	1710	1850	3340	13694
53	ES2QN	KO29	437	81	848	2380	1963	5689	13098
54	DL4ALI	JO50	431	87	464	628	1850	3969	12195
55	DJ6XV	JO31	428	85	512	1007	1130	4805	11502
56	DL9GU	JN49	402	0	721	450	0	8500	15625
57	ES2NA	KO29	393	80	883	1870	1983	4647	11576
58	OK1MP	JO70	390	82	1125	1077	1753	3541	13452
59	ES2RW	KO29	382	55	410	1896	0	3827	9515
60	OK1IBL	JO60	377	77	530	1320	1717	6941	11816
61	HB9SJV	JN26	374	90	526	768	1474	5784	14658
62	PA5DD	JO22	374	107	0	0	0	0	0
63	SP2IQW	JO94	367	68	631	1537	1470	4034	10964
64	ES1II	KO29	367	81	335	1569	1410	3325	13978
65	DL6BF	JO32	365	71	1193	1326	0	4955	11582
66	HB9AOF	JN36	350	82	500	0	0	5400	10663
67	F5PAU	IN88	345	90	0	0	0	0	0
68	DG1VL	JO61	344	63	430	1336	0	4697	10502
69	ES1RF	KO29	340	63	340	1250	0	2800	11549
70	DL1SUZ	JO53	338	71	546	1434	865	5921	11859
71	SM3BIU	JP73	336	77	907	1704	1982	4414	0
72	LY2SA	KO14	336	74	374	960	904	4031	12947
73	ES4EQ	KO39	334	63	392	1869	0	4750	13005
74	PE1OGF	JO21	332	76	0	0	0	0	0
75	SM7JUQ	JO65	331	84	372	1349	1062	3900	14070
76	OZ7IS	JO65	324	84	410	1294	850	3100	0
77	PA2CHR	JO22	316	95	1334	1403	0	5215	0
78	F8CS	JN27	313	68	336	0	0	7454	9753
79	ES6QB	KO37	310	74	450	625	0	5145	13410
80	ES3BR	KO29	309	55	387	1900	1600	4536	11530
81	DC9YC	JO31	306	68	666	1154	0	5112	11921
82	I3ZVN	JN55	304	69	532	0	0	5742	8422
83	OE1SOW	JN88	302	68	0	0	0	0	11921
84	ES1MW	KO29	298	60	315	650	0	3972	9619
85	ES5AM	KO38	289	53	452	1754	1981	4500	12923
86	DL3YEE	JO42	284	69	540	1056	1300	2700	13053
87	LZ1AG	KN22	281	74	375	0	0	3782	10628
88	HB9STY	JN36	280	65	367	0	1431	4448	7810
89	ES2QH	KO29	279	60	372	1740	1710	2542	13682
90	DL7YS	JO62	275	64	342	461	1086	3547	8767
91	F1FIH	JN23	273	98	796	0	1637	2492	15613
92	ES2CM	KO29	270	56	353	1841	1228	4236	11537
93	ES0HD	KO18	264	51	400	1111	0	2430	0
94	ES4NG	KO39	261	55	1044	1129	1625	3105	11635
95	CT1HZE	IM57	261	55	0	0	0	0	0
96	OK1UDX	JN79	260	50	440	1054	0	3513	7505
97	OK1VQ	JO60	259	46	245	539	0	2002	2755
98	ES1AC	KO29	258	51	540	1724	0	5698	11543
99	PA4VHF	JO32	257	58	559	902	755	4832	11534
100	ES6DO	KO28	252	61	489	308	0	3839	8429
101	SP2JXN	JO94	249	55	0	0	0	0	0
102	ES1ABR	KO29	248	50	540	1724	0	5698	11543
103	OE3OKS	JN87	243	45	467	0	0	7985	0
104	DF1EQ	JO31	242	0	279	0	0	2769	11510
105	ES5DE	KO38	239	56	228	606	0	5299	8249
106	DK2BJ	JO30	236	50	471	805	0	3194	8274
107	G7LRQ	IO91	234	59	0	0	0	3574	0
108	ES5MC	KO38	232	61	432	1786	0	5143	13142
109	IW2DVK	JN45	230	51	534	0	1649	7332	9837
110	OK1DIG	JO60	224	58	177	1340	1003	4258	14624
111	CT1BGE	IM58	215	1	0	0	0	0	0
112	ES5RY	KO38	214	53	317	0	0	3640	8249
113	DL8GAP	JN48	212	61	365	0	0	6924	13801
114	ES5GI	KO38	210	45	310	650	0	2510	11610
115	OK2PPP	JN99	201	40	0	0	0	3200	0
116	OK1DKS	JO70	198	42	934	0	0	1973	8514
117	HB9Q	JN47	197	60	0	0	0	0	0
118	DC0KO	JO31	196	46	224	532	0	3261	0
119	DL8EBW	JO31	187	50	247	1050	1150	5800	0
120	DJ5VW	JO31	185	60	0	0	0	8065	0
121	CT1DIN	IN60	174	37	1581	0	0	3169	0
122	IK1PAG	JN35	174	50	350	0	0	3300	0
123	DG3HS	JO53	157	45	422	0	0	3578	13892
124	IT9VDQ	JM68	129	48	837	0	0	2814	7811
125	F1JKY	JN25	128	35	688	0	815	2043	7197
126	ES3RM	KO28	127	31	210	692	0	3111	0
127	ES5QA	KO38	115	28	0	0	0	2852	0
128	CT1DDW	IN60	110	50	2100	0	0	4699	0
129	CT1FAK	IN50	108	1	0	0	0	5395	0
130	S53J	JN75	105	33	0	0	0	0	0
131	PA0JUS	JO22	92	0	325	1706	0	0	14850

144 MHz Toplist (without EME)

NR	Call	WW Loc	Wkd Sqr	DXCC	Aurora Tropo		MS	Es	(ODX) Iono
1	DK1KO	JO53	695	0	2124	2057	2210	3285	0
2	DK3WG	JO72	679	72	2243	2034	2295	2782	1429
3	PA3BIY	JO22	630	64	1550	2026	2205	3143	0
4	DL8EBW	JO31	607	66	1454	1918	2123	2305	0
5	DF8LC	JO53	600	70	2105	2045	2226	3291	0
6	PA0RDY	JO22	568	67	1582	1979	2272	2819	0
7	DL8HCZ	JO53	561	60	1615	1976	2096	3527	1500
8	SM6CMU	JO57	534	0	1760	1928	2280	2540	0
9	PA3FOC	JO21	522	59	1373	2010	2209	2326	0
10	OH5LK	KP30	521	0	1962	2041	2235	2891	0
11	I2FAK	JN45	521	0	1797	1508	2405	2995	0
12	SP6GZZ	JO81	520	0	1670	1794	2017	2717	0
13	SP9EWU	JO90	517	63	1710	1927	2154	2871	0
14	DK6AS	JO52	516	0	1460	1885	2510	2260	0
15	PA2CHR	JO22	515	101	1514	1751	2240	3201	1971
16	I4XCC	JN63	513	77	1188	1826	2275	3248	1746
17	HA1YA	JN87	513	72	1548	1876	2183	2885	0
18	DD0VF	JO61	489	62	1736	1701	2017	2617	0
19	DK0OG	JN68	489	67	1708	1722	2172	3320	0
20	DJ7OF	JO51	489	63	1512	1518	2152	2156	0
21	PA3DZL	JO21	484	59	1405	1851	2167	3107	0
22	LY2WR	KO24	483	57	2051	2075	2347	3007	0
23	DH3YAK	JO31	472	61	1424	1162	2105	2650	0
24	ON4ANT	JO20	469	67	1420	1965	2150	2725	0
25	DL8LAQ	JO43	465	0	1376	1806	1934	3302	0
26	ON4GG	JO20	464	68	1420	1965	2150	2124	0
27	DL3AMA	JO51	464	58	1785	1803	1925	2083	0
28	YU7EW	KN05	459	67	1404	1868	2179	2430	2082
29	IZ5EME	JN52	458	65	1590	0	2090	2893	2030
30	SP4MPB	KO03	457	53	1886	1764	2090	2697	0
31	OH7PI	KP32	451	0	1902	1926	2151	2489	0
32	OK2ZW	JN89	445	56	1417	1775	2113	2471	0
33	YU7MS	KN05	437	62	1319	1856	2160	2438	2130
34	F8OP	JN26	431	63	1228	1196	2028	2720	0
35	OK2VMD	JN89	428	58	1662	1765	2031	3605	0
36	YO2IS	KN05	417	67	1360	1916	2130	2556	0
37	PA4VHF	JO32	416	0	1536	1337	2085	2086	0
38	OK1KT	JO70	416	58	1411	1545	1900	2808	0
39	ES2WX	KO29	415	40	1370	1950	2270	2071	0
40	IW1AZJ	JN35	411	62	1115	1188	2151	2780	0
41	OK1FM	JN69	403	56	1843	1438	2200	2150	0
42	PE1HWO	JO21	399	62	1500	1403	2184	2316	0
43	ES6RQ	KO37	391	37	1500	1840	2172	1725	0
44	HB9Q	JN47	391	66	1404	1288	2060	2959	0
45	OK1JKT/P	JO60	389	52	1701	1764	2121	2269	0
46	F8CS	JN27	387	54	1161	1468	2124	3231	0
47	OE6IWG	JN77	384	61	1221	1110	2220	2126	1214
48	YL3AG	KO26	374	39	1552	1912	0	2452	0
49	S50C	JN76	369	62	1463	1817	2233	3356	1608
50	DL1KDA	JO30	366	59	1388	1924	2101	2339	0
51	SM7JUQ	JO65	365	41	1902	1646	1921	2332	0
52	DL6BF	JO32	363	50	1542	1932	1814	2332	0
53	IK1PAG	JN35	361	57	1186	0	2254	2725	0
54	DL7YS	JO62	360	53	1512	1528	1826	2136	0
55	ES2RJ	KO29	358	40	1190	1861	2000	2127	0
56	OE3OKS	JN87	356	59	1441	1273	1867	2788	0
57	SM3BIU	JP73	353	32	1460	1844	2260	2242	0
58	UR5BAE	KN29	351	53	1994	1924	1866	2492	0
59	F6DKW	JN18	349	53	1519	1712	2051	2755	0
60	PA0WWM	JO22	347	54	1303	1839	1997	2255	0
61	YU1WP	JN94	346	53	1422	1850	2236	2825	1953
62	UT5ER	KN78	345	0	1975	2014	2135	2525	0
63	PA2DWH	JO22	345	59	1230	1950	2150	2250	0
64	OK2BFH	JN99	340	46	2092	1929	1699	3790	0
65	YU7VA	KN05	340	60	1316	1399	1954	2446	0
66	YU7EF	KN05	340	58	1135	987	2248	2440	2373
67	PE1OGF	JO21	338	58	1391	1602	1959	2259	1856
68	G3LQR	JO02	337	0	1776	2031	0	2406	0
69	DK1KR	JO53	336	0	1481	2103	0	2375	0
70	F1FIH	JN23	334	58	1305	999	1860	2934	0
71	OK1DKS	JO70	334	56	1230	1308	0	3530	0
72	ON4KHG	JO10	332	51	1507	1592	2094	2312	0
73	F5HRY	JN18	325	55	1276	1695	2038	2758	0
74	LY2SA	KO14	322	48	1906	1846	2220	2088	0
75	OK1FFD	JO60	322	54	1388	1808	1991	2197	0
76	DB6BX	JO32	321	55	1534	1541	1921	2126	0
77	ON1IM	JO11	320	42	1420	1310	1865	2306	0
78	OK1MG	JO70	319	50	1522	1685	1549	2631	0
79	ON4KST	JO20	314	54	1435	1612	1940	2383	0
80	DL1SUZ	JO53	313	47	1238	1661	1963	2309	0
81	PA5DD	JO22	312	50	1382	1829	2098	2307	0
82	PA2TAB	JO32	312	53	1302	1239	2103	2183	0
83	OK1DFC/P	JO60	310	52	1775	2453	2289	2453	0
84	ES2XM	KO29	308	37	1389	2198	0	2222	0
85	ON4PS	JO20	307	51	1449	1878	2018	2364	0
86	SP6GWB/P	JO80	306	47	1780	1581	1875	2437	0
97	G4LOH	IO94	304	46	3130	2143	2045	2480	1831
88	ES4EQ	KO39	302	39	1541	1840	2240	2245	0
89	OK1AXH	JO70	300	0	2142	1486	1366	1768	0
90	DF1IAZ	JN49	299	54	1038	1177	2069	1996	0
91	HB9DFG	JN37	298	53	1367	1323	1942	2302	712
92	SP2JXN	JO94	289	41	1650	1690	0	2634	0
93	DK2BJ	JO30	287	49	1476	1934	1593	2231	0
94	DH0GHU	JN38	284	49	1170	1170	2117	3067	0
95	ES3GZ	KO28	281	35	1495	1720	2134	2101	0
96	ES5WE	KO38	278	32	1406	1695	1934	2530	0
97	OM7AQ	JN98	274	50	1484	1691	2045	2483	0
98	PA0ZM	JO32	268	45	1156	1771	2061	2246	0
99	DG1VL	JO61	267	46	1373	1223	1817	2325	0
100	DH8GV	JO33	267	42	1565	1018	1102	2450	0
101	OK1IBL	JO60	266	50	1438	1462	2003	3398	0
102	RW3PF	KO93	265	31	1031	2151	2243	2268	0
103	GM4JJJ	IO86	261	44	3253	1804	1868	2858	0
104	LZ1AG	KN22	256	42	915	0	1779	2503	0
105	ES1RF	KO29	252	30	1184	1820	1978	2084	0
106	DK1VI	JN49	251	50	1270	1215	1604	3165	0
107	DH9NBB	JN49	249	54	1363	1228	1846	2039	0
108	YU1VG	JN94	248	47	1407	826	1727	2294	1982
109	DC9YC	JO31	247	44	1548	1724	1849	1822	0
110	OK1VMS	JO70	246	51	1692	1423	0	2587	0
111	F5PAU	IN88	246	46	1630	0	0	2425	0
112	HA8MV	KN06	245	38	1062	1736	2026	2162	0
113	OK1PG	JO70	243	50	1773	1243	0	3488	0
114	DG3XA	JO43	240	42	1371	965	1832	2333	0
115	PA0BAT	JO31	239	48	1311	1714	2498	2366	0
116	OK2QI	JO80	238	50	1475	1686	1380	2050	0
117	OK1KEI	JO70	236	36	1861	1259	1482	2067	0
118	F5HGO	JN05	235	44	1782	0	2024	2486	0
119	G3XDY	JO02	233	38	1355	2049	1835	2124	0
120	F5DE	JN05	232	42	1891	1671	1892	2399	0
121	OK1VBN	JN78	225	45	1578	1682	1915	2209	0
122	ES5EJ	KO38	218	30	1422	1804	0	2070	0
123	OK1DDO	JO60	218	46	1329	1500	1720	2418	0
124	ES0IW	KO19	216	32	1545	1687	0	1861	0
125	DL2DR	JO31	212	39	1158	980	0	2057	0
126	OK1DIG	JO60	208	42	1420	1684	1840	2218	0
127	ES0NW	KO19	207	30	1060	1720	1797	1965	0
128	DL0UL/P	JN48	207	37	1026	0	1839	2019	0
129	OK1IAS	JO60	205	41	1392	1957	0	2466	0
130	OK1SC	JO70	204	0	1490	1673	0	1729	0
131	YU7ON	KN04	203	37	914	0	1897	2273	1485
132	OE5VRL/5	JN78	201	0	1665	1634	1990	2157	0
133	OH0NC	JP90	201	26	1544	1982	1647	2493	0
134	PA0JUS	JO22	200	38	1409	1050	0	2167	0

135	ES8RO	KO28	199	27	1802	1800	0	1780	0	
136	UA4AQL	LO20	199	23	1124	1994	2158	2195	0	
137	IT9VDQ	JM68	197	45	1676	0	2169	2491	0	
138	ES0SM	KO08	196	31	1578	1767	1991	0	0	
139	DK2DB	JN48	195	0	1239	1136	0	3106	0	
140	F1HDF/P	JN18	194	0	1452	0	0	2425	0	
141	ES1OX	KO29	194	18	1016	1449	1158	2121	0	
142	DL3YEE	JO42	191	40	1574	1450	1480	2106	0	
143	ES7RDR	KO27	189	31	1200	1750	1000	2101	0	
144	ES0HD	KO18	187	23	1550	1918	0	0	0	
145	HB9MIO/P	JN37	185	0	1316	975	0	2183	0	
146	DG3HS	JO53	184	35	1152	1091	0	2306	0	
147	ES5RY	KO38	183	32	1198	1695	2002	1409	0	
148	YU7KB	JN94	183	42	853	0	1874	2256	1532	
149	PA3AOH	JO31	182	38	1457	1341	0	2345	0	
150	YZ7MON	JN95	180	37	1004	0	1837	2279	1536	
151	DK5WO	JO30	177	35	1474	1219	0	1993	0	
152	SP2IQW	JO94	174	28	1611	1611	997	1877	0	
153	OK1KOK	JO80	173	27	1486	1062	0	1920	0	
154	HB9AQF	JN36	173	45	1201	670	1675	2166	0	
155	OK1VEI	JO70	170	32	1677	1197	1398	0	0	
156	ON4ZN	JO21	169	35	1428	980	0	2149	0	
157	DJ8ES	JO43	169	32	1306	1432	2034	2116	0	
158	ES1AO	KO29	169	25	1162	1176	1792	2136	0	
159	OK1KRY	JN69	166	40	1437	977	0	1830	0	
160	SP9FG	JN99	164	31	1647	1283	0	1798	0	
161	ES1JL	KO29	163	17	1379	1596	0	0	0	
162	OK1CDJ	JO70	159	42	1580	0	2066	2655	0	
163	ES1AW	KO29	158	25	1230	1680	0	1924	0	
164	OK1CA	JO70	156	0	1540	1065	950	2096	0	
165	DJ6XV	JO31	156	34	1337	992	0	2007	0	
166	ES0BI	KO18	154	21	1439	1823	1528	0	0	
167	ES2QN	KO29	152	22	1175	1460	0	2116	0	
168	OZ7IS	JO65	151	32	1128	1294	1901	1845	0	
169	ES6PZ	KO38	151	20	1101	0	0	2532	0	
170	CT1FAK	IN50	149	25	2129	0	2250	2488	968	
171	DK0PX	JN48	147	0	1161	0	1815	1649	0	
172	ES1CW	KO29	142	21	1192	1570	0	2143	0	
173	DL0GTH	JO50	139	23	1124	0	0	0	0	
174	OK2UFB	JN99	136	27	1526	0	0	1983	0	
175	RW4AK (sk)	LO20	136	0	1126	1480	2158	2301	0	
176	ES5QA	KO38	135	35	1665	1788	1555	2236	0	
177	DL3IAS	JN49	130	36	988	1123	1830	1866	0	
178	OK1DTG/P	JO70	127	27	1351	1352	0	0	0	
179	YU7AZX	KN04	126	30	914	0	1389	2173	1484	
180	OZ1FF	JO45	125	35	974	1239	1520	2357	0	
181	F1PYW	JN38	124	30	936	888	1522	1958	0	
182	HB9S/P	JN36	123	24	1135	0	0	0	0	
183	S53J	JN75	123	27	1123	1036	983	1984	0	
184	OK1VDA	JO70	123	30	938	641	0	2220	0	
185	F1PYR	JN19	120	0	0	0	0	0	0	
186	F6FGO	JN25	118	31	1390	0	0	2218	0	
187	OL5Z	JN89	118	26	1061	1621	0	0	0	
188	OK2KJU	JN89	115	32	1318	1766	0	1494	0	
189	DL0SP/P	JO62	115	23	1315	785	0	1608	0	
190	OK2KKW	JO60	115	24	1040	0	0	0	0	
191	OE1SOW	JN88	112	32	0	1286	0	2250	0	
192	DL5NEN	JN59	106	30	748	0	1767	1640	0	
193	OK1TEH	JO70	103	30	1191	1474	0	2058	0	
194	I3ZVN	JN55	98	32	1212	0	0	2237	0	
195	OK2PHM	JN89	97	20	829	1265	0	2262	0	
196	YU1EBC	JN94	94	28	907	0	1427	2179	1766	
197	LA/DL7YS/P	JO37	93	22	1207	0	1673	0	0	
198	DK0FLT	JN59	93	18	975	0	0	0	0	
199	CT1DIN	IN60	91	18	1218	0	0	2338	0	
200	OK1UDX	JN79	91	19	537	0	0	0	2197	
201	CT1DDW	IN60	90	17	2100	0	0	2500	0	
202	DK2MN	JO32	87	19	858	0	0	0	0	
203	CT1CAD	IM67	85	18	1304	0	0	2249	0	
204	YU1AAV	KN04	71	21	828	0	0	2031	0	
205	OK1HRR	JO70	66	16	762	0	0	1890	0	
206	G7LRQ	IO91	60	19	1088	0	0	0	0	
207	OK2DTF	JN79	60	16	805	0	1607	1533	0	
208	SP6MLK/P	JO80	58	16	853	756	0	1446	0	
209	DG7SFL	JN49	57	11	759	0	0	1750	0	
210	OK1VVW	JO70	55	15	913	0	1339	1096	0	
211	F5OIH/P	JN08	49	8	666	0	0	0	0	
212	IW3HTU	JN55	43	13	1180	0	0	0	0	
213	F1JKY	JN25	41	10	798	0	400	991	0	
214	IZ0BXT	JN63	37	12	804	0	0	1946	0	

432 MHz Toplist (without EME)

NR	Call	WW Loc	Wkd Sqr	DXCC	Aurora Tropo	Aurora MS	Es	(ODX) Iono
1	DK3WG	JO72	214	43	1547	1494	0	0	0
2	PA0RDY	JO22	207	38	1979	1807	1376	0	0
3	PA0EZ	JO22	207	35	1787	1445	0	0	0
4	G3LQR	JO02	206	0	2031	1613	0	0	0
5	PA0WWM	JO22	198	37	1547	1836	0	0	0
6	HA1YA	JN87	190	43	1438	1221	0	0	0
7	DL8QS	JO43	189	35	1513	1513	0	0	0
8	OZ7IS	JO65	188	32	1499	1048	1294	0	0
9	OK1AXH	JO70	181	0	1861	1239	0	0	0
10	G3XDY	JO02	176	28	1589	1619	0	0	0
11	DB6BX	JO32	174	34	1550	662	0	0	0
12	DL7QY	JN59	173	0	1640	1848	1292	0	0
13	PA3DZL	JO21	172	32	1405	1851	1864	0	0
14	DJ6MB	JO30	171	0	1278	1733	0	0	0
15	LY2WR	KO24	169	26	1995	1593	1935	0	0
16	F6DKW	JN18	165	23	1519	0	0	0	0
17	DK6AS	JO52	164	0	1569	775	0	0	0
18	DK1KO	JO53	163	0	1643	694	0	0	0
19	SP6MLK/P	JO80	162	31	1780	0	0	0	0
20	DF8LC	JO53	161	0	1615	1361	0	0	0
21	DB6NT	JO50	158	31	1823	0	0	0	0
22	PA4FP	JO33	156	32	2114	1010	0	0	0
23	SM7ECM	JO65	156	26	1389	1073	0	0	0
24	SP6GWB/P	JO80	155	30	1780	759	0	0	0
25	DK1KR	JO53	154	0	1400	1827	0	0	0
26	OK2BFH	JN99	153	31	1914	0	0	0	0
27	OZ2OE	JO45	152	27	2216	1020	0	0	0
28	SM6ESG	JO67	152	26	1436	712	0	0	0
29	YL3AG	KO26	150	20	1571	1041	0	0	0
30	DH3NAN	JO50	147	0	1437	1008	0	0	0
31	OK1CA	JO70	146	0	1670	0	0	0	0
32	DL3YEE	JO42	144	29	1574	1728	0	0	0
33	PA3AOH	JO31	143	27	1530	573	0	0	0
34	ES2WX	KO29	140	17	1232	1415	0	0	0
35	OK1KEI	JO70	138	27	1682	1185	0	0	0
36	SP9FG	JN99	137	26	1660	0	0	0	0
37	OH0NC	KP00	136	20	1598	920	0	0	0
38	OK1VEI	JO70	136	21	1532	811	0	0	0
39	PA2CHR	JO22	136	35	1423	695	1099	0	0
40	SP9EWU	JO90	135	30	1589	1558	1664	0	0
41	OK1KIR/P	JO60	133	28	1773	0	0	0	0
42	PA0JUS	JO22	133	26	1340	0	0	0	0
43	OK1VMS	JO70	131	32	1434	972	0	0	0
44	OH5LK	KP30	131	0	1386	1196	0	0	0
45	PA0BAT	JO31	125	23	1396	413	0	0	0
46	PA0ZM	JO32	122	25	1358	1693	0	0	0
47	OE5VRL/5	JN78	121	0	1524	1031	0	0	0
48	ON4PS	JO20	121	22	1425	721	0	0	0
49	OK2KKW	JO60	120	26	1186	0	0	0	0
50	F5PAU	IN88	119	24	1630	0	0	0	0
51	DK0OG	JN68	115	27	1459	745	0	0	0
52	ON4ZN	JO21	115	21	1173	0	0	0	0

53	OK2QI	JO80	114	25	1410	0	0	0	0
54	DL3AMA	JO51	114	22	1015	1219	0	0	0
55	DL0UL/P	JN48	113	22	1238	0	0	0	0
56	DL6BCT	JO43	113	0	1152	0	0	0	0
57	DJ6XV	JO31	113	19	1128	976	0	0	0
58	SP6GZZ	JO81	112	0	1549	870	0	0	0
59	PE1OGF	JO21	112	18	1288	0	0	0	0
60	DH9NBB	JN49	109	24	1363	0	0	0	0
61	DL2DR	JO31	109	21	1158	0	0	0	0
62	SM6CMU	JO57	108	0	1641	670	0	0	0
63	F1HDF/P	JN18	108	0	1204	0	0	0	0
64	PA5DD	JO22	106	19	1462	1025	1808	0	0
65	DL0GTH	JO50	106	20	1113	0	0	0	0
66	DL4KG	JO31	105	21	1273	0	0	0	0
67	OK1DFC/P	JO60	104	22	1179	0	0	0	0
68	DK5WO	JO30	104	20	1150	0	0	0	0
69	DC4XH	JO43	104	20	1133	808	0	0	0
70	ES6RQ	KO37	103	19	1452	1148	0	0	0
71	DG3XA	JO43	103	16	1131	0	0	0	0
72	OK1AIY/P	JO70	102	0	1490	0	0	0	0
73	ON1IM	JO11	102	20	1410	0	0	0	0
74	DL1KDA	JO30	102	22	1286	999	1334	0	0
75	F5HRY	JN18	102	18	1222	583	0	0	0
76	OK1DKS/P	JO60	102	23	1118	0	0	0	0
77	DL1SUZ	JO53	101	18	1218	707	0	0	0
78	ON4GG	JO20	98	23	1407	0	0	0	0
79	LY2SA	KO14	97	20	1669	946	0	0	0
80	F5HGO	JN05	97	17	1237	0	0	0	0
81	ON4ANT	JO20	96	23	1407	0	0	0	0
82	DH8GV	JO33	95	19	1259	0	0	0	0
83	PE1HWO	JO21	94	19	1306	369	0	0	0
84	DL6BF	JO32	94	15	882	894	0	0	0
85	DJ8ES	JO43	94	13	1087	0	0	0	0
86	OK1KRY	JN69	93	23	1350	0	0	0	0
87	DK2DB	JN48	92	0	1331	0	0	0	0
88	ES2XM	KO29	92	11	1271	1259	0	0	0
89	S50C	JN76	91	18	977	0	0	0	0
90	OK1KPA	JN79	89	0	1176	0	0	0	0
91	DK0PX	JN48	89	0	1168	0	0	0	0
92	OK1OKL	JO60	88	0	1199	0	0	0	0
93	ES2RJ	KO29	87	17	1261	1123	0	0	0
94	DK1VI	JN49	87	21	1125	936	0	0	0
95	IZ5EME	JN52	86	20	1458	1670	374	0	0
96	DG1VL	JO61	86	16	1245	0	0	0	0
97	HB9MIO/P	JN37	84	0	1096	0	0	0	0
98	HB9AOF	JN36	84	15	926	0	0	0	0
99	ES0HD	KO18	83	19	1565	614	0	0	0
100	OK1KOK	JO80	81	22	1486	0	0	0	0
101	OK1MG	JO70	81	21	1329	691	0	0	0
102	DL7YS	JO62	81	18	1100	0	0	0	0
103	OZ1FF	JO45	81	18	1092	633	0	0	0
104	DF1EQ	JO31	80	0	1249	0	0	0	0
105	ES4EQ	KO39	80	16	1160	907	0	0	0
106	ES0IW	KO19	79	17	1342	906	0	0	0
107	DL9MCC	JN58	77	20	1338	0	0	0	0
108	DL5NEN/P	JN59	76	16	964	0	0	0	0
109	DH3YAK	JO31	75	13	1165	0	0	0	0
110	F1PYR	JN19	75	0	0	0	0	0	0
111	OK1FFD	JO60	74	23	1339	0	0	0	0
112	DG6GP	JN48	74	13	1024	0	0	0	0
113	OK1KRQ/P	JN69	73	16	1091	0	0	0	0
114	OK1SC	JO70	71	0	1310	758	0	0	0
115	OK2PWY	JN89	70	17	1135	0	0	0	0
116	OL5Z	JN89	70	15	761	0	0	0	0
117	DL0SP/P	JO62	69	13	1018	0	0	0	0
118	OK1DTG/P	JO70	68	14	1436	0	0	0	0
119	DK2MN	JO32	67	13	715	0	0	0	0
120	DD0VF	JO60	66	19	1106	0	0	0	0
121	SM7JUQ	JO65	65	15	1232	0	0	0	0
122	UR5BAE	KN29	64	18	1517	0	0	0	0
123	OM7AQ	JN98	64	13	922	0	0	0	0
124	HB9CRQ	JN47	63	16	1010	0	0	0	0
125	ES5WE	KO38	62	11	1406	0	0	0	0
126	DG7SFL	JN49	61	10	947	0	0	0	0
127	DL3IAS	JN49	61	12	886	0	0	0	0
128	F6FGO	JN25	60	11	1016	0	0	0	0
129	ES0NW	KO29	59	17	1213	675	0	0	0
130	ES0SM	KO08	59	20	1202	925	0	0	0
131	DK2BJ	JO30	59	16	1053	0	0	0	0
132	OK2UFB	JN99	56	20	1232	0	0	0	0
133	DH0GHU	JN38	56	12	852	0	0	0	0
134	OK1VBN	JN78	56	14	723	753	0	0	0
135	YO2IS	KN05	55	15	1020	1741	1030	0	0
136	LA/DB1DI/P	JO37	55	12	1013	0	0	0	0
137	OK1PG	JO70	54	18	1773	0	0	0	0
138	ES3GZ	KO28	52	10	1035	0	0	0	0
139	RB5EF	KN78	50	0	1805	0	0	0	0
140	F5DE	JN05	50	8	740	0	0	0	0
141	SP2JXN	JO94	49	15	1149	0	0	0	0
142	OK1TEH	JO70	49	15	912	0	0	0	0
143	S53J	JN75	49	9	688	0	0	0	0
144	ES1JL	KO29	48	11	1324	0	0	0	0
145	DK0FLT	JN49	48	14	695	0	0	0	0
146	ES1RF	KO29	47	10	875	682	0	0	0
147	HA8MV	KN06	47	15	713	1500	0	0	0
148	F5OIH/P	JN08	46	5	651	0	0	0	0
149	DL5NEN	JN59	46	13	630	0	0	0	0
150	SM3BIU	JP73	45	3	917	763	0	0	0
151	GM4JJJ	IO86	44	15	1457	297	0	0	0
152	I3ZVN	JN55	43	13	1197	0	0	0	0
153	OE1PLW	JN88	42	12	1114	0	0	0	0
154	OK2KJU	JN89	42	13	731	0	0	0	0
155	OK1KT	JO70	40	7	1289	757	0	0	0
156	OK1HRR	JO70	40	13	765	0	0	0	0
157	OK2PHM	JN89	39	9	746	0	0	0	0
158	G7LRQ	IO91	37	15	1208	0	0	0	0
159	RW3PF	KO93	37	5	678	1697	0	0	0
160	OK2VMU/P	JN99	36	11	880	0	0	0	0
161	ES1AO	KO29	35	12	1131	0	0	0	0
162	DF0RU	JO62	35	9	682	0	0	0	0
163	ES0ZA	KO19	33	8	1077	0	0	0	0
164	ES1DF	KO29	32	7	511	0	0	0	0
165	ES1CW	KO19	32	7	500	688	0	0	0
166	F1FIH	JN23	30	7	796	0	0	0	0
167	ES0IC	KO18	30	7	673	0	0	0	0
168	OK1DIG	JO60	28	28	640	0	0	0	0
169	ES5MG	KO38	28	9	626	0	0	0	0
170	ER5MG	KO38	28	9	626	0	0	0	0
171	ES0B I	KO18	28	7	378	0	0	0	0
172	ES1CR	KO29	27	12	930	0	0	0	0
173	ES5QA	KO38	26	8	803	0	0	0	0
174	ES0QY	KO18	25	8	650	0	0	0	0
175	ES1AW	KO29	24	7	512	0	0	0	0
176	CT1DDW	IN60	23	3	2100	0	0	0	0
177	ES1II	KO29	22	4	506	0	0	0	0
178	IW3HTU	JN55	21	6	1110	0	0	0	0
179	CT1FAK	IN50	20	4	1588	0	0	0	0
180	UA4AQL	LO20	18	4	1124	0	0	0	0
181	CT1DIN	IN60	7	2	334	0	0	0	0
182	RW4AK (sk)	LO20	6	0	679	0	0	0	0

1296 MHz Toplist (without EME)

NR	Call	WW	Wkd	DXCC	ODX
1	PA0EZ	JO22	140	24	1298
2	PA0WWM	JO22	134	24	1298
3	PA0RDY	JO22	124	27	1286
4	G3XDY	JO02	123	23	1341
5	F6DKW	JN18	121	21	1273
6	OK1AXH	JO70	118	0	1444
7	G3LQR	JO02	118	0	1274
8	HB9AMH/P	JN37	114	0	1351
9	DB6NT	JO50	109	22	1243
10	SM7ECM	JO65	108	18	1326
11	SP6GWB/P	JO80	101	24	1580
12	PA0BAT	JO31	100	22	1368
13	SM6ESG	JO67	99	19	1445
14	DB6BX	JO32	99	25	1125
15	SP6MLK/P	JO80	92	23	1580
16	OE5VRL/5	JN78	92	18	1524
17	OZ2OE	JO45	92	17	1425
18	OK1KIR/P	JO60	92	22	1208
19	OK2BFH	JN99	91	20	1713
20	F5PAU	IN88	89	19	1630
21	G6DER	IO93	89	20	1306
22	PA3DZL	JO21	89	19	1000
23	PA3AOH	JO31	86	19	1306
24	DL7QY	JN59	86	0	1261
25	OK1DFC/P	JO60	86	17	1177
26	DK1KR	JO53	86	0	1097
27	PA4FP	JO33	86	17	957
28	DL3YEE	JO42	85	16	1136
29	OK1VEI	JO70	82	14	1313
30	OZ7IS	JO65	82	18	1205
31	F5HRY	JN18	82	13	1064
32	DK0OG	JN68	82	0	1160
33	DK6AS	JO52	81	0	1421
34	OK1KEI	JO70	81	16	1316
35	F1HDF/P	JN18	80	9	886
36	HB9AOF	JN36	77	15	975
37	DC9YC	JO31	74	16	1046
38	DL0UL/P	JN48	74	17	962
39	OK1AIY/P	JO70	73	0	1490
40	PA5DD	JO22	73	17	1302
41	OK1VMS	JO70	73	19	1302
42	PA0JUS	JO22	72	16	1265
43	HB9MIO/P	JN37	72	0	1000
44	DH3NAN	JO50	71	0	1143
45	DH9NBB	JN49	71	13	1016
46	OK1CA	JO70	70	0	1421
47	PA2CHR	JO22	69	16	1329
48	PA0ZM (sk)	JO32	69	16	1329
49	DK5WO	JO30	69	16	1137
50	DL2DR	JO31	68	13	1158
51	DC4XH	JO43	67	14	1090
52	DL0GTH	JO50	67	16	1073
53	DF1EQ	JO31	67	0	908
54	OK2KKW	JO60	66	18	1128
55	OK1OKL	JO60	63	0	1177
56	ON4PS	JO20	63	14	1098
57	SP9FG	JN99	62	17	1492
58	OK1DKS/P	JO60	62	13	1207
59	DL1SUZ	JO53	61	14	968
60	OK1FFD	JO60	60	14	1058
61	DJ8ES	JO43	60	10	1025
62	ON4GG	JO20	60	10	982
63	OH0NC	KP00	57	13	1592
64	ON4ANT	JO20	57	9	914
65	DJ6XV	JO31	56	11	946
66	DC8UG	JO30	56	10	900
67	DC0DA	JO31	55	1	1034
68	LY2WR	KO24	53	14	1026
69	F1PYR	JN19	53		
70	PE1HWO	JO21	52	14	1315
71	DL3NQ	JN49	51	9	920
72	DK0FLT	JN59	51	12	684
73	DL1KDA	JO30	50	12	940
74	DJ1KP	JO40	50	0	698
75	OZ1FF	JO45	49	13	980
76	SP9EWU	JO90	48	12	946
77	DL3IAS	JN49	48	9	769
78	DK2MN	JO32	48	10	692
79	DK0PX	JN48	47	0	942
80	F6CGB	JN18	45	0	700
81	S50C	JN76	43	12	626
82	IZ5EME	JN52	42	10	1036
83	DJ6MB	JO30	42	0	876
84	YL3AG	KO26	42	11	867
85	HA1YA	JN87	42	13	862
86	ES2RJ	KO29	40	9	765
87	OK1KRQ/P	JN69	39	11	962
88	DK2DB	JN48	39	0	873
89	OK1KEI/P	JN79	39	10	740
90	LA/DB1DI/P	JO37	38	9	1013
91	DK2BJ	JO30	38	10	886
92	DG1VL/P	JO61	37	7	723
93	ON4KHG	JO10	37	6	642
94	I0LVA/0	JN62	35	0	1152
95	G7LRQ	IO91	35	10	746
96	ES2WX	KO29	35	9	692
97	DG6GP	JN48	33	7	732
98	DH3YAK	JO31	33	5	715
99	ES4EQ	KO39	33	9	636
100	ES6RQ	KO37	33	9	600
101	F5HGO	JN05	32	4	796
102	DK1VI	JN49	30	10	717
103	ES5WE	KO38	29	7	1249
104	DL7YS	JO62	29	7	535
105	I3ZVN	JN55	28	9	1197
106	IW3FZQ/4	JN54	27	7	732
107	ES0SM	KO08	26	8	873
108	F6FGO	JN25	26	4	839
109	DF5JJ	JO43	25	3	433
110	OK1DTG/P	JO70	24	8	742
111	OK2QI	JO80	23	7	1275
112	F1FIH	JN23	23	6	605
113	OK1VBN	JN78	22	9	950
114	G4LDR	IO91	22	5	593
115	HA8MV	KN06	22	9	576
116	OH5LK	KP30	21	0	1349
117	OK1PG	JO70	21	9	985
118	PE1OGF	JO21	21	6	588
119	OK2BFF/P	JO80	21	8	536
120	ON1IM	JO11	20	5	650
121	OK2VMU/P	JN99	20	7	570
122	DL0SP/P	JO62	20	5	430
123	OK1KRY	JN69	19	7	865
124	OK1KPA	JN79	19	0	783
125	OK2BBF	JN89	19	8	563
126	OL5Z	JN89	18	6	694
127	F5OIH/P	JN08	17	5	517
128	IW3HTU	JN55	16	4	838
129	S53J	JN75	16	6	410
130	DL5NEN	JN59	16	16	320
131	ES1RF	KO29	15	5	506
132	DG7SFL	JN49	15	3	358
133	OK1TEH	JO70	15	4	343
134	ES1AJ	KO29	14	5	531
135	ES2XM	KO29	14	5	478
136	DF0RU	JO62	14	3	373
137	ES2WR	KO29	13	5	694
138	ES0Z	KO18	13	5	453
139	F5DE	JN05	13	2	440
140	SM7JUQ	JO65	12	7	1061
141	ES1NJ	KO29	12	4	507
142	ES1MW	KO29	11	4	507
143	ES0W	KO18	11	5	443
144	OK1SC	JO70	10	0	440
145	OM7AQ	JN98	10	5	426
146	OK2PWY	JN89	10	6	357
147	OK2KJU	JN89	10	6	347
148	OK2PHM	JN89	10	0	341
149	IT9VDQ	JN68	9	1	899
150	ES1OX	KO29	9	5	772
151	ES1DW	KO29	9	5	330
152	YO2IS	KN05	8	5	472
153	OK1HRR	JO70	8	2	292
154	DL3AMA	JO51	8	3	162
155	ES1TCA	KO29	7	2	246
156	ES2NA	KO29	6	4	349
157	OK1ZVP	JO60	6	1	263
158	ES0NW	KO19	5	2	190
159	ES1AW	KO29	3	2	269
160	OK2UFB	JN89	3	2	142
161	ES1WQ	KO29	2	2	337
162	ES2NT	KO29	2	1	149
163	ES6RAT	KO28	2	1	125
164	ES1JL	KO29	2	2	108
165	DG3XA/P	JO43	1	1	289
166	ES2QN	KO29	1	1	198

2320 MHz Toplist (without EME)

1	PA0EZ	JO22	81	15	1014
2	PA0WWM	JO22	71	16	1155
3	DB6NT	JO50	69	15	1119
4	PA0RDY	JO22	65	15	1000
5	G3LQR	JO02	58	0	1006
6	SM6ESG	JO67	53	8	1054
7	OK1KIR/P	JO60	51	10	1115
8	PA0BAT	JO31	50	13	923
9	OE5VRL/5	JN78	48	12	1291/495
10	G3XDY	JO02	48	11	1176
11	DL7QY	JN59	47	0	1018
12	SM7ECM	JO65	47	9	942
13	G6DER	IO93	46	18	1265
14	OK1AIY/P	JO70	44	0	1296
15	PA4FP	JO33	44	12	727
16	DL0GTH	JO50	42	7	1052
17	F5HRY	JN18	41	6	877
18	PA5DD	JO22	36	9	1155
19	DJ1KP	JO40	36	0	698
20	DC8UG	JO30	35	8	900
21	PA3DZL	JO21	34	11	913
22	OK1OKL	JO60	34	0	830
23	DF1EQ	JO31	34	0	678
24	DL0UL/P	JN48	33	11	961
25	OZ2OE	JO45	33	8	914
26	HB9MIO/P	JN37	32	0	744
27	DC0DA	JO31	31	1	775
28	DC9YC	JO31	30	10	858
29	DL3NQ	JN49	29	8	890
30	OZ7IS	JO65	29	9	860
31	DK0OG	JN68	29	1	675
32	DL3YEE	JO42	29	10	520
33	DH9NBB	JN49	27	7	654
34	DK0PX	JN48	26	0	853

35	DL2DR	JO31	26	0	823
36	DK2MN	JO32	25	6	635
37	I0LVA/0	JN62	25	0	612
38	OK2BFH	JN99	24	9	1026
39	DL1SUZ	JO53	24	7	747
40	F1PYR	JN19	24	0	0
41	DK2DB	JN48	22	0	873
42	OK1KEI/P	JN79	22	7	677
43	OK1DKS/P	JO60	22	4	602
44	SP6GWB/P	JO80	21	5	650
45	DL3IAS	JN49	21	6	604
46	F1HDF/P	JN18	20	3	621
47	OK1DFC/P	JO60	20	6	549
48	I3ZVN	JN55	19	7	603
49	DJ8ES	JO43	19	7	1025
50	ON4PS	JO20	19	6	574
51	HB9AMH/P	JN37	18	0	933
52	LA/DB1DI/P	JO37	17	7	825
53	S51WI	JN75	17	5	533
54	PA3AOH	JO31	16	6	785
55	HA1YA	JN87	15	5	476
56	OK1KRQ/P	JN69	15	4	350
57	DK6AS	JO52	14	0	620
58	PA0JUS	JO22	13	5	800
59	DK1KR	JO53	13	0	792
60	SP9FG	JN99	13	5	747
61	OK2BFF/P	JO80	13	6	418
62	DJ6XV	JO31	12	3	396
63	IZ5EME	JN52	10	3	552
64	G4LDR	IO91	10	2	444
65	IW3FZQ/4	JN54	10	3	403
66	OK1KEI	JO70	9	4	786
67	IW3HTU	JN55	9	2	542
68	OK2VMU/P	JN99	9	4	376
69	S50C	JN76	8	5	346
70	OK1CA	JO70	8	1	291
71	SP6MLK/P	JO80	8	3	272
72	F1FIH	JN23	8	1	239
73	F6CGB	JN18	7	0	407
74	DG6GP	JN48	7	2	388
75	OK1PG	JO70	6	4	855
76	OK1KRY	JN69	5	3	189
77	OK2QI	JO80	4	2	305
78	F5PAU	IN88	4	0	260
79	DG1VL/P	JO61	4	2	230
80	OL5Z	JN89	4	3	158
81	OM7AQ	JN98	3	3	281
82	OK1VBN	JN78	3	3	158
83	DL1KDA	JO30	3	2	98
84	G8BKE/P	IO80	1	1	114

3400 MHz Toplist (without EME)

1	DB6NT	JO50	44	7	741
2	PA0EZ	JO22	31	8	835
3	PA0WWM	JO22	26	6	850/414
4	G3LQR	JO02	23	0	924
5	PA0BAT	JO31	23	4	729
6	PA0RDY	JO22	19	3	643
7	PA5DD	JO22	18	5	867
8	DC0DA	JO31	17	1	660
9	G6DER	IO93	16	7	859
10	PA4FP	JO33	16	5	733
11	DK2MN	JO32	16	3	422
12	DL3NQ	JN49	15	5	637
13	DL7QY	JN59	15	0	565
14	G3XDY	JO02	15	3	506
15	DC8UG	JO30	13	6	724
16	DF1EQ	JO31	13	0	532
17	DL2DR	JO31	13	0	470
18	DL6NCI	JO50	13	3	413
19	HB9MIO/P	JN37	12	0	463
20	DK2DB	JN48	11	0	331
21	DK0PX	JN48	9	0	632
22	DL0UL/P	JN48	9	1	239
23	DL0GTH	JO50	7	2	466
24	OK1AIY/P	JO70	6	0	768
25	OZ2OE	JO45	5	4	772
26	DJ8ES	JO43	5	3	578
27	DJ6XV	JO31	5	3	396
28	DG1VL/P	JO61	5	2	252
29	OK1KEI/P	JN79	3	2	306
30	S51WI	JN75	3	1	98
31	DK0OG	JN68	3	1	78
32	OK1DFC	JO60	2	2	59
33	G8BKE/P	IO80	1	1	114
34	SP6GWB/P	JO80	1	1	2
35	SP6MLK/P	JO80	1	2	1

5760 MHz Toplist (without EME)

1	DB6NT	JO50	49	13	1000
2	PA0EZ	JO22	44	15	1017
3	SM7ECM	JO65	44	8	960/647
4	F5HRY	JN18	43	7	686
5	HB9AMH/P	JN37	37	9	929
6	OE5VRL/5	JN78	34	10	901/683
7	HB9MIO/P	JN37	34	0	694
8	F1PYR/P	JN19	33	0	0
9	PA0BAT	JO31	32	11	729
10	SM6ESG	JO67	30	6	951
11	F1HDF/P	JN18	30	4	638
12	PA0WWM	JO22	28	9	863/589
13	DL6NCI	JO50	25	9	600
14	G3LQR	JO02	23	0	949
15	PA5DD	JO22	22	7	867/415
16	F1GHB/P	IN88	22	4	779
17	I3ZVN	JN55	19	7	573
18	OK1KIR/P	JO60	17	3	393
19	SP6GWB/P	JO80	16	5	1024
20	OK1UWA/P	JO70	16	1	998
21	S51JN/P	JN65	16	5	557
22	OK1KEI/P	JN79	16	6	393
23	S51WI	JN75	15	4	586
24	G6DER	IO93	14	8	947
25	OK1AIY/P	JO70	14	0	736
26	DL0UL/P	JN48	14	5	660
27	I0LVA/0	JN62	14	0	557
28	DK2MN	JO32	14	3	422
29	G3XDY	JO02	14	5	415
30	G4LDR	IO91	13	4	444
31	PA4FP	JO33	12	4	733
32	DC0DA	JO31	12	1	660
33	DL3NQ	JN49	12	4	318
34	OK2BFH	JN99	11	5	756
35	DC8UG	JO30	11	5	724
36	OZ7IS	JO65	11	4	593
37	DK2DB	JN48	11	0	315
38	DL7QY	JN59	10	0	565
39	DG1VL/P	JO61	10	4	525
40	DK0OG	JN68	10	2	375
41	OK1OKL	JO60	9	1	611
42	DK0PX	JN48	9	0	409
43	IW3FZQ/4	JN54	9	4	291
44	DL2DR	JO31	9	0	201
45	IW3HTU	JN55	8	3	542
46	LA/DB1DI/P	JO37	7	5	746
47	DL0GTH	JO50	7	2	674
48	HA1YA	JN87	6	5	461
49	SP6MLK/P	JO80	6	4	339
50	OK1DKS/P	JO60	6	1	318
51	DC8EC/P	JN57	6	1	278
52	OZ2OE	JO45	5	5	679
53	DJ8ES	JO43	5	5	578
54	DF1EQ	JO31	5	0	461
55	F6CGB	JN18	5	0	407
56	DJ6XV	JO31	5	2	176
57	OK2VMU/P	JN99	4	2	376
58	OK1KRY	JN69	3	2	175
59	S50C	JN76	3	1	126
60	F6CGB/P	JN24	2	0	375
61	G8BKE/P	IO80	2	1	242
62	OK2QI	JO80	2	1	108
63	ES2WX	KO29	2	2	89
64	OK1KRQ/P	JN69	1	1	96
65	OK1SC	JO70	1	1	10

10368 MHz Toplist (without EME)

Nr	Call	Loc	Sqr	Dxcc	ODX Tropo/RS
1	F6DKW	JN18	76	11	1215
2	PA0EZ	JO22	75	14	1017
3	F5HRY	JN18	71	10	877
4	PA0WWM	JO22	67	14	850/850
5	SM7ECM	JO65	61	9	1110/711
6	DK1KR	JO53	58	12	868/725
7	OK1JKT/P	JO60	58	14	655/845
8	OE5VRL/5	JN78	56	14	1135/786
9	DB6NT	JO50	56	17	1000
10	PA0BAT	JO31	56	13	785
11	G3WDG	IO92	55	0	1135
12	F1HDF/P	JN18	55	8	867
13	G4KGC	IO92	53	0	1135
14	G3LQR	JO02	52	0	1006
15	HB9AMH/P	JN37	51	0	939
16	DM2AFN	JO61	49	13	661
17	DL4EAU/P	JO51	48	9	826
18	DL3YEE	JO42	48	12	625/700
19	DJ1KP	JO40	46	0	656
20	HB9MIN/P	JN37	45	0	939
21	PA5DD	JO22	45	11	867
22	I6CXB/6	JN63	44	0	751
23	OK1DIG	JO60	44	12	551/689
24	DG1VL/P	JO61	43	8	807
25	G3XDY	JO02	42	12	1012
26	DL3NQ	JN49	42	9	712
27	DL6NCI	JO50	42	11	567/960
28	HB9MIO/P	JN37	40	0	744
29	OK1VAM	JN79	40	12	304
30	G4BRK	IO91	39	0	1115
31	I6XCK/6	JN63	39	0	702
32	DK0FLT	JN59	39	10	683
33	DC8EC	JN57	39	12	661
34	OK1VAM/P	JO60	39	11	640
35	S51JN/P	JN65	39	13	637
36	SM6ESG	JO67	38	6	1275
37	DL0UL/P	JN48	38	8	658
38	DK0OG	JN68	38	7	524
39	I0LVA/0	JN62	37	8	850
40	SP6GWB/P	JO80	37	10	787
41	LX1DU	JN29	37	0	700
42	DK8ZP	JO40	37	0	586
43	DH9NBB	JN49	36	9	654
44	G3GNR	IO70	34	0	1275

45	HB9RG	JN47	34	0	761
46	OK1AIY/P	JO70	34	0	736
47	OK2BFH	JN99	33	7	769/669
48	G4LDR	IO91	32	9	1118
49	DL6NAQ/P	JO40	32	8	656
50	DK2MN	JO32	32	8	633
51	DC9YC	JO31	32	9	599
52	G4DDK	JO02	31	0	901
53	SP6MLK/P	JO80	31	10	752/352
54	OK1KEI/P	JN79	31	8	636
55	DL1BKK	JO43	30	0	842
56	OK1DFC/P	JO60	30	7	668
57	DL0GTH	JO50	30	7	240
58	EA6ADW/P	JM19	29	7	1090
59	IW6AEG/6	JN63	29	0	751
60	OZ1IPU	JO57	28	7	941
61	OK1KIR/P	JO60	28	6	658
62	DL3IAS	JN49	28	9	584
63	OK1OKL	JO60	27	0	795
64	F1GHB/P	IN88	27	5	669
65	S50C	JN76	27	9	505
66	DL1SUZ	JO53	26	5	362/572
67	PA4FP	JO33	25	8	865
68	DK0PX	JN48	25	0	567
69	S51WI	JN75	24	6	586/343
70	DK4GD/P	JN48	24	0	566
71	ON4KHG	JO10	24	6	565/496
72	PA3AOH	JO31	24	7	531
73	OZ2OE	JO45	23	6	789
74	ON7WR	JO20	23	9	756
75	I3ZVN	JN55	23	8	573
76	DC0DA	JO31	22	1	816
77	DL2DR	JO31	22	4	603
78	DJ5VW	JO31	21	5	474
79	DC8UG	JO30	20	6	753
80	DB1BX	JO32	20	7	705
81	DL4VCG	JN39	20	0	533
82	DF9QX	JO42	19	0	504
83	DK2DB	JN48	19	0	432
84	DF5JJ	JO43	19	5	297/555
85	I4XCC	JN63	18	7	522/454
86	LA/DB1DI/P	JO37	18	6	825
87	DJ8ES	JO43	18	6	596
88	DL5NEN/P	JN49	18	6	466
89	HA1YA	JN87	16	6	564
90	OK2PWY	JO80	16	5	558/594
91	IW3FZQ/4	JN54	16	5	557
92	ON7YK	JO20	16	0	494
93	F5PAU	IN88	16	2	430
94	OK1KRQ/P	JN69	16	3	325
95	HB9AMH	JN37	15	0	567
96	DL7QY	JN59	15	0	492
97	OK1UWA/P	JO70	15	0	434
98	IW5ADB	JN53	14	0	1053
99	G4PMK	IO93	14	0	958
100	OZ1FF	JO45	14	7	740
101	SP9FG	JN99	13	5	611/518
102	OZ1DOQ	JO65	13	5	472
103	DF1IAZ	JN49	12	2	515
104	OH0NC	KP00	12	4	269
105	GW4LXO	IO81	12	0	309
106	G4KNZ	IO91	12	0	247
107	OK1DKS/P	JO60	11	2	616
108	DJ6XV	JO31	10	3	285
109	F6CGB	JN18	9	0	677
110	G4LRT	IO92	8	0	824
111	IW3HTU	JN55	8	2	542
112	IW3QCV	JN65	8	2	532
113	F5HRY/P	JN08	8	2	491
114	DL1KDA	JO30	8	4	477
115	F6CGB/P	JN12	7	0	823
116	DF1EQ	JO31	7	0	283
117	DF1EQ/P	JO31	7	0	283
118	ES0SM	KO08	5	2	384
119	DG0CAL	JO52	5	0	255
120	LA8AK	JO38	5	0	212
121	OK2QI	JO80	4	1	303
122	G8BKE/P	IO80	4	1	242
123	F5OIH/P	JN08	4	1	149
124	OK2VMU/P	JN99	3	2	376
125	PA0JUS	JO22	3	2	245
126	DH3NAN	JO50	3	0	134
127	DG5NEX	JN49	1	0	173
128	OK1KRY	JN69	1	1	78
129	GM0ICF	IO75	1	1	53
130	DL0SP/P	JO62	1	1	28
131	SM4SJY	JP70	1	1	160

24 GHz Toplist (without EME)

1	DB6NT	JO50	11	4	301
2	OE5VRL/5	JN78	11	3	289/289
3	DC8EC/P	JN57	10	2	301
4	HB9AMH/P	JN37	10	0	286
5	HB9MIO/P	JN37	10	0	172
6	PA0EZ	JO22	9	3	391
7	IW3EHQ/P	JN66	8	1	461
8	I0LVA/0	JN62	8	3	444
9	DJ1KP	JO40	8	0	273
10	PA0BAT	JO31	8	3	195
11	DC0DA/P	JO41	8	1	131
12	OK1AIY/P	JO70	7	0	281
13	SM6ESG	JO67	7	3	242
14	EA6/DF5JJ	JM19	7	2	226
15	DK0OG	JN68	7	2	193
16	S51JN/P	JN65	6	3	293
17	DL3NQ	JN49	6	3	287
18	DL6NCI	JO50	6	3	280
19	IW3FZQ/4	JN54	6	3	250
20	I3ZVN	JN55	6	2	210
21	G3LQR	JO02	5	0	261
22	OK1KIR/P	JO60	5	2	227
23	PA0WWM	JO22	5	2	210/210
24	OK1OKL	JO60	5	0	185
25	DL3YEE/P	JO42	5	1	151
26	DK2MN	JO32	5	2	132
27	F1PYR/P	JN19	5	0	0
28	OK1UWA/P	JO70	4	0	188
29	OK1DFC/P	JO60	4	2	185
30	DK8ZP	JO40	4	0	178
31	DK0PX	JN48	4	0	168
32	F1GHB/P	IN88	4	0	158
33	G3GNR	IP70	4	0	154
34	PA5DD	JO22	4	1	121
35	PA3AOH	JO31	4	2	121
36	DL2DR	JO31	4	1	98
37	F5HRY	JN18	4	1	96
38	F1HDF/P	JN18	3	1	230
39	OK1KEI/P	JN79	3	2	189
40	G4KNZ/P	JO02	3	0	173
41	SM7ECM	JO65	3	2	168/168
42	IW3HTU	JN55	3	1	160
43	DG1VL/P	JO61	3	2	113
44	DL0GTH	JO50	3	1	108
45	GW8BKE/P	IO71	2	1	170
46	DF1EQ	JO31	2	0	133
47	DC9YC	JO31	2	2	87
48	OZ2OE	JO45	2	1	52
48	DK2DB	JN48	2	0	48
50	SP9FG	JN99	2	1	33
51	DF5JJ	JO43	2	1	55
52	G8BKE/P	IO80	1	1	139
53	F5OIH/P	JN08	1	1	90
54	CT1FP	IN50	1	1	82
55	CT1DMK	IN50	1	1	82
56	DJ6XV	JO31	1	1	75
57	F6CGB/P	JN37	1	0	74
58	DJ5VW	JO31	1	1	61
59	OK1OGS/P	JN69	1	1	60
60	OK1JKT	JO60	1	1	18
61	DL7QY	JN59	1	0	13
62	SP6GWB/P	JO80	1	1	2
63	SP6MLK/P	JO80	1	1	1

47 GHz Toplist

1	DF1EQ/P	JO30	10	1	2
2	HB9MIO/P	JN37	8	1	166
3	DC0DA/P	JO41	7	1	131
4	IW3FZQ/4	JN54	6	1	188
5	I3ZVN	JN55	5	1	179
6	HB9AMH/P	JN37	5	1	166
7	OE5VRL/5	JN78	3	2	201
8	IW3EHQ/P	JN65	3	1	111
9	DL2DR	JO31	3	1	95
10	OK1OKL	JO60	2	2	96
11	OK1UWA/P	JO70	2	1	96
12	OK1AIY-P	JO60	2	1	96
13	DB6NT	JO50	2	2	95
14	DL6NCI	JO50	2	2	83
15	DK0PX	JN48	2	1	62
16	DL3YEE/P	JO42	2	1	45
17	DK2MN	JO32	2	2	30
18	DC8EC/P	JN57	2	1	29
19	F1PYR/P	JN19	2	1	0
20	DL/HB9AMH/P	JN48	1	1	184
21	GW8BKE/P	IO71	1	1	93
22	IW3HTU	JN55	1	1	87
23	G8BKE/P	IO90	1	1	79
24	OK1KIR/P	JO60	1	1	5
25	OK1AIY/P	JO70	1	1	5
26	SP6MLK/P	JO70	1	1	1
27	PA0BAT	JO31	1	1	1
28	CT1FP	IN50	1	1	1
29	CT1DMK	IN50	1	1	1

76 GHzToplist

1	HB9MIO/P	JN37	4	1	114
2	DB6NT	JO50	2	1	77
3	DC0DA/P	JO50	2	1	48
4	G8BKE/p	IO80	1	1	79
5	G8BKE/P	IO91	1	1	33
6	OK1AIY/P	JO70	1	1	12
7	DC8EC/P	JN57	1	1	5
8	HB9AMH/P	JN37	1	1	1

145 GHzToplist

1	DB6NT	JO50	1	1	3
2	IW3EHQ/P	JN65	1	1	2
3	DC0DA/P	JO41	1	1	1
4	G7FRE	JO01	1	1	1
5	G4FRE/P	JO01	1	1	1

241 GHzToplist

1	DB6NT	JO50	1	1	2
2	HB9MIO/P	JN37	1	1	1

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28 MHz input power can be adjusted between 1 mW to 100 mW

The 2 m module will follow after ending this development.

NEW

Announcement:

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Many customers requested for a transverter from 144 MHz to 1296 MHz. Now, we decided to develop such a product. It will have the following specifications:

-> Input frequency range 144 – 146 MHz
-> Input power 0,1 – 3 Watt abjustable
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-> noise figure typ. 1 dB
-> Converter gain >20 dB adjustable
-> divided input for RX

The version for 28 – 30 MHz IF will follow after ending this development.

NEW

Announcement:

2,3 GHz Transverter System

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-> Input frequency range 144 – 146 MHz
-> Input power 0,1 – 3 Watt adjustable
->Output power 15 Watt
-> noise figure typ. 1 dB
-> Converter gain >20 dB adjustable
-> divided input for RX

NEW

The transverter will have a sequence controller for drive an external antenna relais / preamplifier and power amplifier. Please inquire, then we will send you after ending these developments futher technical informations.

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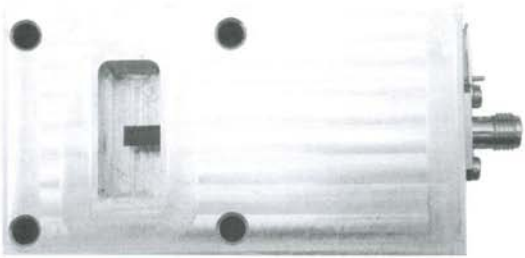

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