Vol. 23

# DUBUS

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# Expedition SP9PRO/7

## DUBUS

**die zweisprachige Zeitschrift für den Schmalband-DX-Amateur auf UKW von 50MHZ bis 241GHz. Geschrieben von aktiven UKW-Amateuren für aktive UKW-Amateure.**

## DUBUS

**Entirely devoted to DX-ing on VHF/UHF and Microwaves (50MHz...241GHz). Fully bilingual and written by active radio amateurs for active radio amateurs.**

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# Editorial

Rainer Bertelsmeier, DJ9BV

## Liebe Leser!

Ein weiteres Jahr mit vier DUBUS Heften liegt hinter uns. Während dieser Zeit sind einige Veränderungen eingetreten.

Um den weltweiten Informationsaustausch zwischen den UKW-DXern zu fördern, haben wir die Rubriken MICROWAVE USA und MICROWAVE Japan eingeführt. Das gibt den europäischen Amateuren die Möglichkeit, die Entwicklung unseres Steckenpferdes in diesen wichtigen Ländern zu verfolgen.

In der Zusammensetzung der Mannschaft haben sich ebenfalls Veränderungen ergeben: Der Redakteur für Computer News, Hellmuth Fischer, DF7VX, hat die DUBUS verlassen. Wir danken ihm für die langjährige Mitarbeit. Seine Aufgaben übernimmt Gerold Bächle, DF5GX. Wir begrüßen den neuen Editor für FAI, Georges Vialet, F8OP, und wünschen ihm einen guten Wirkungsgrad. Neue Distributoren sind für Tschechien und Schweden angetreten: In OK Milan Gütter, OK1FM, und in SM Anders Petterson, SM7ECM.

Der Bezugspreis für das Inland mußte auf DM 32,- angehoben werden. Denken Sie bitte daran, das Abonnement rechtzeitig zu erneuern.

Viel Glück für 1995 und 73

**Rainer, DJ9BV**

## Dear Reader

Another year with four issues of DUBUS has passed. Some changes have occurred.

To encourage the world-wide information exchange on microwave amateur radio we have introduced the new columns MICROWAVE USA and MICROWAVE Japan. This is an opportunity for the European amateurs to participate in the development of our hobby in those countries.

Some changes concern the DUBUS staff. Hellmuth Fischer, DF7VX, has left us. We have to thank for his long-term contributions to the magazine. The column 'Computer News' is handled by Gerold, DF5GX, in the future. We are proud to announce, that Georges Vialet, F8OP, will conduct the FAI column in the future. We all wish good luck and high efficiency for Georges. We have new distributors in Sweden: Anders Petterson, SM7ECM, and in Czech Republic: Milan Gütter, OK1FM.

Last but not least we had to increase the subscription rate for Europe to DM 32.-. The overseas rate is the same as before.

Please don't forget to renew your subscription for 1995.

Happy new Year 1995 and 73

**Rainer, DJ9BV**

# Technical Reports

Editor: Rainer Bertelsmeier, DJ9BV

# 2.5W Amplifier for 10GHz

*Silvano Ricci, I0LVA*

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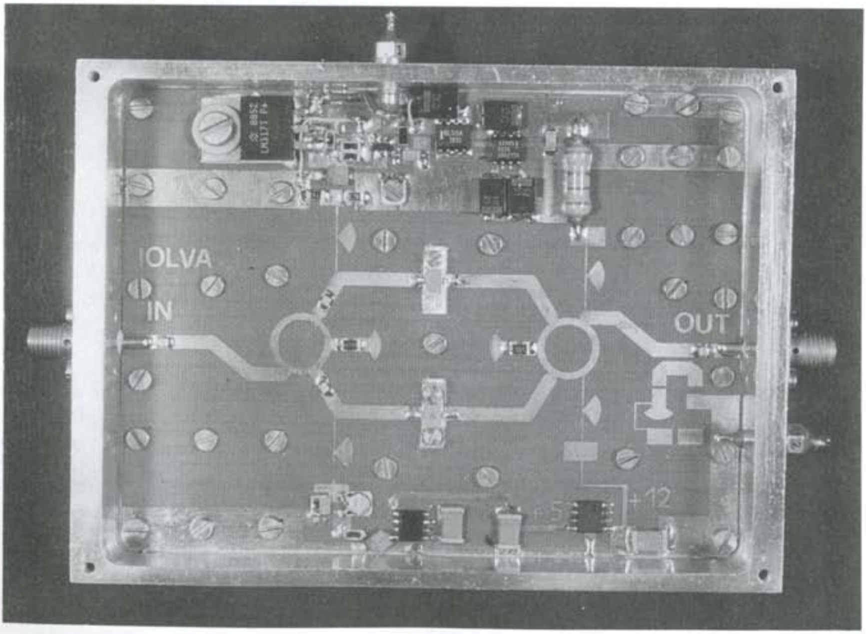
**Abstract:** The article describes a 2.5W power amplifier for 10GHz. It provides 4.7dB gain. It uses two MGF2445 power GaAs-FETs, which are coupled via two rat-race 180° hybrids.

**Kurzfassung:** Der Artikel beschreibt einen 2,5W Leistungsverstärker für 10GHz mit 4.7dB Verstärkung. Zwei MGF2445 GaAs-FET's werden mit einem 180° Ringhybrid gekoppelt.




**I0LVA Power Amplifier for 10GHz**

## Introduction

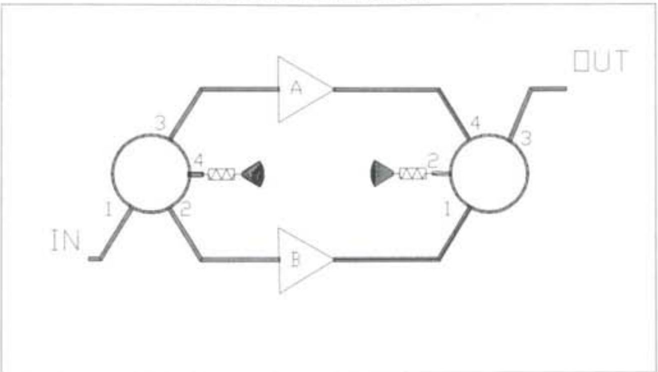
After realizing that I needed more power on 10 GHz I began to think about solutions to increase my power. Two alternatives seemed to be possible:

1. Use a matched power device able to provide 35...38 dBm output. This solution is much too expensive!
2. Use standard device power GaAs - FET MGF 2445 coupled via hybrids.

I have chosen the second solution because it was cheaper than the first one even if it's more difficult and has a larger size.

The result is the linear amplifier that can be seen in the photograph above. The linear amplifier provides a 1 dB compression output power of over 2.5 watts. The devices utilized are Mitsubishi MGF 2445.

**Fig. 1: Block Diagram**




## Einführung

Um die Leistung auf 10 GHz zu erhöhen, gibt es zwei Alternativen:

1. Anwendung eines 4...8 W Transistors
2. Kopplung von MGF 2445 über einen Ringhybrid

Ich habe die zweite Lösung aus Preisgründen gewählt. Es enstand ein 2,5 W Verstärker mit 4,7 dB Verstärkung.

## Theory

The two MGF 2445 are coupled with ring type hybrid. The ring is made of 6 electrical quarter waves as shown in the **fig. 1** . The signal at port " **1** " will be equally divided between ports "**2**" and "**3**"; zero power will appear at port "**4**". The phase relationship at port "**2**" is - 90 deg. and port "**3**" is - 270.Signal arriving at port "**4**" from port "**1**" via port "**2**" is -180 degrees relative to port " **1**". The result is that at port "**4**" the signal are 180 degrees out of phase and cancel. Signal to the output ring is fed into port "**1**" and port "**4**". Signal fed into port "**1**" arriving at port "**4**" via port "**2**" is 180 degrees out of phase with that arriving via port "**3**". The net result is that signal from one device is not fed into the other. Signal arrives at port "**3**" in phase as result of the 180 degrees phase difference that exists in the input ring.

## Theorie

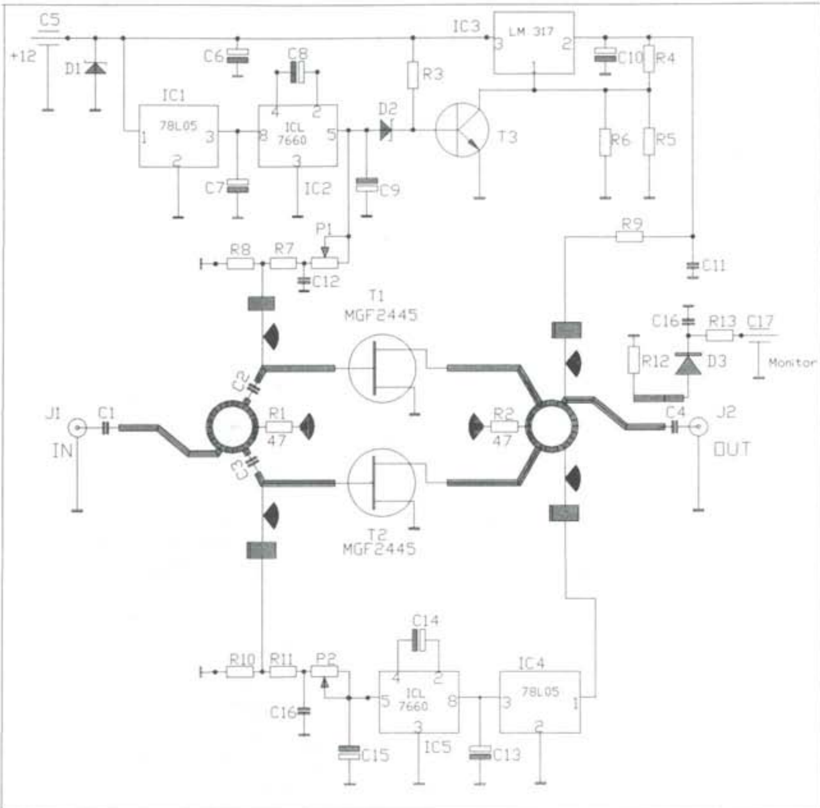
Der Ringhybrid, der beide MGF 2445 Stufen koppelt, besteht aus 6 $\lambda/4$-Leitungen mit $70\Omega$ Wellenwiderstand wie in Abb.1 gezeigt. Das Signal an Tor 1 wird zu gleichen Teile auf Tor 2 und 3 aufgeteilt. An Tor 4 löschen sich die Signale aus, weil sie 180° Phasenunterscheid haben. Zwischen Tor 2 und 3 sind 180° Phasenunterschied. Als Leistungssummierer werden die Signale in Tor 1 und 4 eingespeist. Die Summenleistung wird an Tor 3 entnommen. Die Tore 1 und 4 sind isoliert, so daß sich die Verstärker nicht beeinflussen können.

## Circuit description

Fig. 2 shows the circuit of the HPA. It uses a printed circuit board ( fig. 3) construction in micro-stripline technique on 0.79 mm thick RT-Duroid 5870 with $\varepsilon_r = 2.33$. The dimensions are 100 x 74 mm standard size that fit into tinplate box or into a brass box silver-plated as I did. This solution provides very good results both from a electrical point of view and for mechanical stability. The size can be learned from fig. 4.

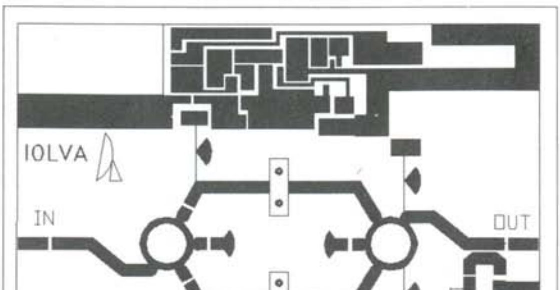
The power supply is integrated into the RF board. It utilizes a LM 317 for the 10 volts of drain voltage and a double bias circuit composed of 78L05 + ICL7660 to supply the negative gate voltage. All components used are SMD with exception of the LM317. With the values shown we have exactly

**Fig. 2: Circuit Diagram**




10 volts for the drain and variable bias voltage from - 0,4 volts to -2,5 volts.

**Bild/Figure 3: PCB**

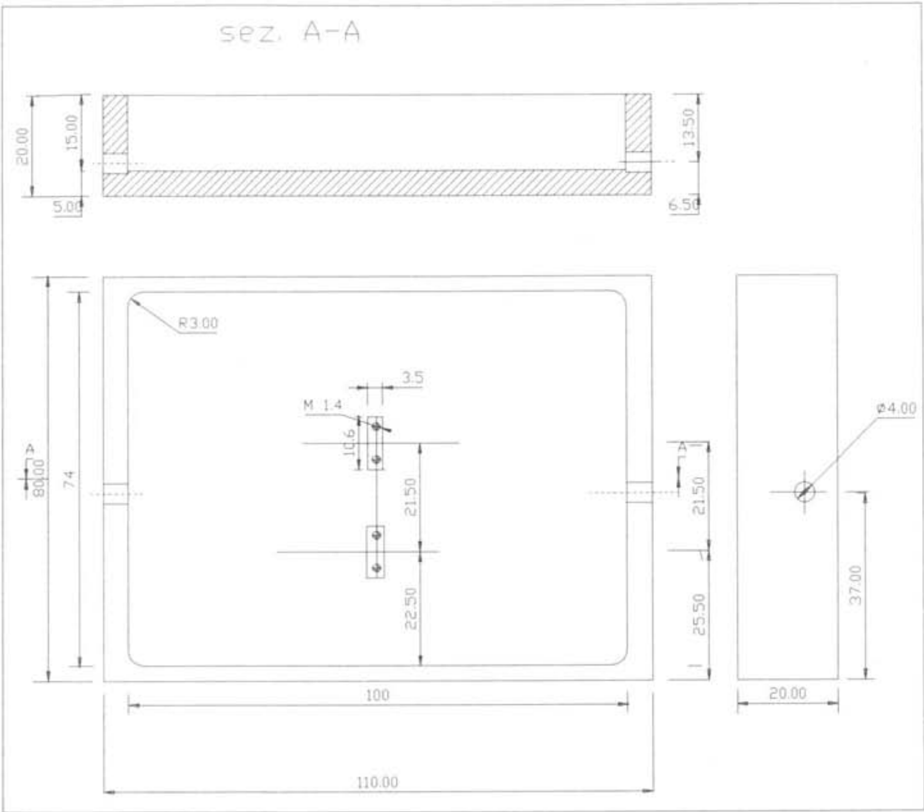



## Schaltung

Abb. 2 zeigt die Schaltung des Verstärkers. Er ist auf einer 0,79 mm starken PTFE-Platine (Abb. 3) aus RT-Duroid 5870 aufgebaut. Die Größe ist 100x 74 mm. Ein versilbertes Messinggehäuse ist am besten geeignet (Abb. 4). Aber auch ein Weißblechgehäuse ist möglich.

Die Stromversorgung ist integriert. Ein LM317 liefert 10 V und ein 78L05 sowie ein ICL7660 erzeugen eine regelbare negative Vorspannung für die Gate-Anschlüsse.

**Fig. 4: Machined Box**

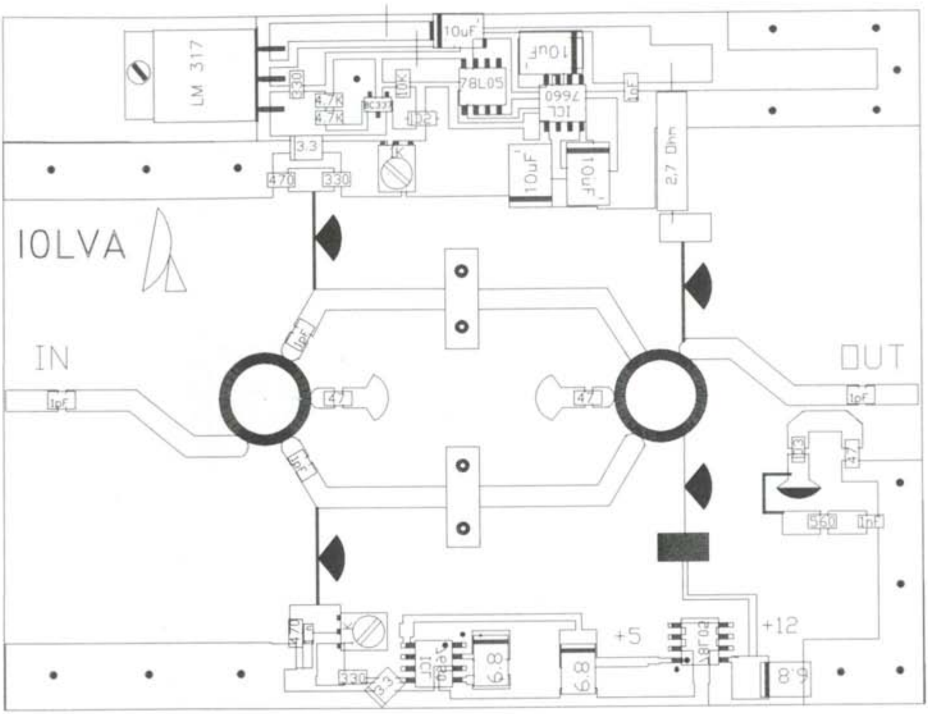



## Construction

Fig. 5 shows the layout of the parts. Chip capacitors input, output and interstage are 1pF from ATC.

1. Cut the PCB to fit it into box, the same is fastened with screws M2 on the silver-plated box bottom. If you use tinplate box the PCB has to be soldered to the both sidewalls.
2. Make two rectangular holes of size 3.5x12 mm where the two GaAs-FET MGF 2445 will reside.
3. Since the GaAs-Fets are 1.65 mm high, it is necessary to make two nut type fittings so that gate and drain leads can flush with the microstripline (see drawing on fig. 6).
4. If you use tinplate box, a fitting has to be machined on the top of a copper or aluminium plate fixed at the PCB with M2 screws. By this a good heat transfer is assured.
5. Make the fitting for LM317T voltage regulator.
6. Make holes for input and output SMA connectors. You can select the right solution for your need (choose male or female SMA connector). I have chosen a female SMA connector for input and a male SMA connector for output:

**Fig. 5: Parts Layout**




in this way the output can be routed directly to the antenna relay.

7. Make holes for 1000 pF feed-through capacitors for power supply and power detector.
8. Make holes of 1.1 mm diameter and a thread M1.4 for fixed GaAs - Fet's.
9. Fix the PCB on the bottom of the brass box silver-plated, mount the SMA connectors, mount feed-throug capacitors, solder all components of the power supply. Test if the voltages are correct (voltages should be around + 10 volts at the drain lead and variable by -0.5 V to -2.5 V at the gate lead)
10. Put GaAs-Fet into nuts and fix them with M1.4 brass screws. Solder leads of drain and gate using only insulated soldering tool, ground the box, your body and the power supply of soldering tool. Never touch the gate lead. Solder operations should be made fast and with a very small amount of solder.

## Konstruktion

Abb. 5 zeigt den Bestückungsplan. Alle Koppelkondensatoren sind 1pf ATC-Chips:

1. Platine zuschneiden

2. Zwei Aussparungen mit 3,5x12 mm Größe in den Boden fräsen
3. LM317 befestigen
4. Löcher für SMA-Buchsen, Durchführungskondensatoren bohren
5. M1,4 Gewinde für FETs schneiden
6. Platine mit M2 Schrauben auf den Boden schrauben. SMA-Buchsen montieren. Durchführungskondensatoren montieren. Die gesamte Stromversorgung bestücken.
7. Stromversorgung testen: +10V am Drain und - 0,5 ...-2,5 V am Gate
8. FET's einschrauben und mit der Platine verlöten

## Test and tuning

Before connecting the 12 V power supply carefully check all solder connections to the SMD components, as well as the GaAs-FET using a magnifying glass. Connect a 10 GHz transverter with about 850 mW output power to the input of the linear amplifier and apply the supply voltage. Cut six pieces of copper or brass foil of diverse size (5 x4, 5x3 and 5x2 mm), turn the amplifier on, and move a copper foil in contact along the micro-stripline from input to output, holding it with a cleft matchstick, until the power output shows an increase on the power meter. Remove the supply voltage and solder the copper or brass foil to the spot wich has been found. Repeat this operation for the number of pieces of copper foils, tune the SMD pots until the power output rises to a maximum of around 2.5/3 Watts and current rises to a maximum of around 1 A.

## Abgleich

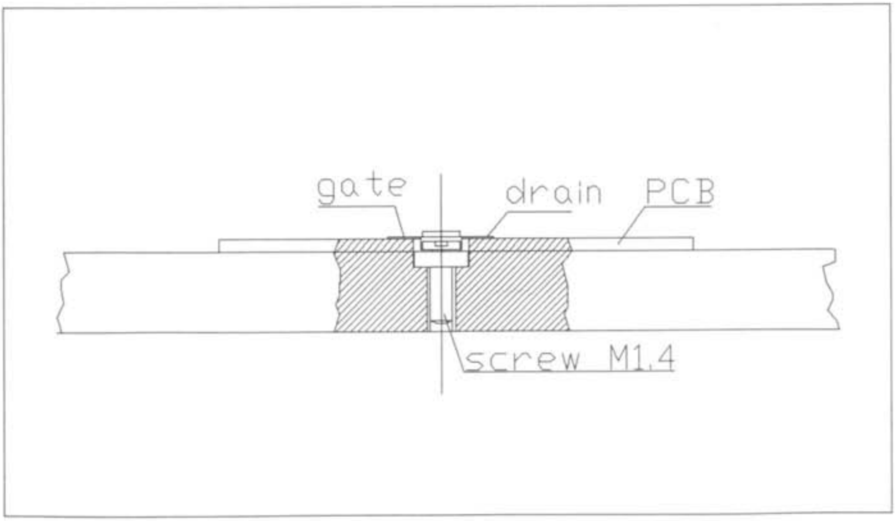
Platine mit Vergrößerungsglas prüfen. Betriebsspannung anlegen. 10GHz Signal mit 800mW anlegen. Sechs Kupferfahnen diverser Größen (5x4, 5x3 und 5x2 mm) zuschneiden. Am Ein- und Ausgang aufbringen und verschieben, bis die Leistung maximal ist. Dann Betriebsspannung entfernen und die Fahnen an den gefundenen Stellen auflöten. Vorspannung ebenfalls optimieren.

## Results

The table below shows the test results achieved with two prototypes.

The instruments used for the measure are following:

1. Power meter HP 435 A
2. Head HP 8481A
3. Sweep generator HP 8620 C with plug-in HP 86290 B
4. Network Analyzer HP 8755 C - HP 11664
5. Spectrum Analyzer HP 141 T + HP8552B + HP 8555




**Bild/Figure 6: Mounting of FET**

**Table 1: Parts**

| Pos | Qty | Reference | Part |
|---|---|---|---|
| 1 | 1 | C1,2 3,4 | 1pF ATC 50mil |
| 2 | 3 | C6,7,8,10 | 10µF/25V SMD |
| 3 | 1 | C9,15 | 3.3µF/25V SMD |
| 4 | 2 | C11,12,16,17,18 | 1nF SMD |
| 5 | 3 | C13,14 | 6.8µF/25V SMD |
| 6 | 2 | C5,18 | 1nF FT |
| 7 | 1 | D1 | Zener 15V |
| 8 | 1 | D2 | Zener 4.7V |
| 9 | 1 | D3 | BAT-15 |
| 10 | 1 | J1 | SMA Socket |
| 11 | 1 | J2 | SMA Socket |
| 12 | 2 | P1,2 | 1k SMD |
| 13 | 3 | R1,2,12 | 47 SMD |
| 14 | 1 | R3 | 10k SMD |
| 15 | 3 | R4,7,11 | 330 SMD |
| 16 | 2 | R5,6 | 4k7 SMD |
| 17 | 2 | R8,10 | 470 SMD |
| 18 | 1 | R9 | 2R7 SMD |
| 19 | 1 | R13 | 560 SMD |
| 20 | 2 | T1,2 | MGF2445 |
| 21 | 1 | T3 | BC337 |
| 22 | 1 | IC1,4 | 78L05 SMD |
| 23 | 1 | IC2,5 | ICL7660 SMD |
| 24 | 1 | IC3 | LM317T |
| 25 | 1 | PTFE PCB | 100x74mm, 0.79mm ($\varepsilon_r$=2.33) |
| 26 | 1 | Box 100x74x30 | Brass, Silver Plated |

6. Variable attenuator HP X382

| Parameter | Unit | No. 1 | No. 2 |
|---|---|---|---|
| $P_{IN}$ | mW | 870 | 900 |
| $P_{OUT}$ | mW | 2550 | 2600 |
| Gain | dB | 4.67 | 4.6 |
| $I_D$ | mA | 800 | 850 |

Good DX on 3 cm band, and good luck with the construction.

For further information please do not hesitate to contact me.

## Ergebnisse

Obige Tabelle zeigt die Resultate für 2 Prototypen. Falls Informationen gebraucht werden, stehe ich jederzeit zur Verfügung.

# Engineering Considerations For Microwave Equipment Design

## (Konstruktionshinweise für den Entwurf von Mikrowellen-Modulen)

*Jim Davey, WA8NLC*

*4664 Jefferson Township Place, Marietta, GA 30066, USA*

## Introduction

With all the construction of homebrew microwave equipment that is going on, it seems appropriate at this time to consolidate some of the "hints and kinks" that have been published and introduce some new information that I believe is not generally known to the amateur community.

This paper will address certain aspects of microwave equipment design that have often made the difference between a well behaved circuit and one with all kinds of gremlins. The topics were selected from my own experience in attempting to build equipment for the bands above 1 GHz. Many fruitful discussions of my experiences with other microwave experimenters and professionals helped greatly in the analysis and understanding of the issues.

The paper is divided into seven subjects as listed below:

1. Enclosure Effects and Selection
2. Printed Circuit Layout and Crosstalk
3. Substrate Effects and Selection
4. Coaxial Transitions
5. RF Bypassing
6. Active Device Selection
7. DC Feed Networks

## Einführung

Um Selbstbauprojekte zu fördern, scheint es mir angebracht, einige Hinweise zur Konstruktion, die bereits veröffentlicht wurden, zu sammeln und auch neue Informationen zu veröffentlichen.

Der Inhalt dieses Artikels ist es, einige wichtige Aspekte beim Entwurf von Mikrowellenschaltungen aufzuzeigen. Die Beachtung dieser Besonderheiten kann den Unterschied zwischen guter Funktion und einigen 'Alpträumen' ausmachen. Die ausgewählten Themen resultieren aus meinen Erfahrungen im Bau von Mikrowellenschaltungen oberhalb von 1GHz und aus vielen Diskussionen mit anderen Mikrowellenamateuren.

Folgende Punkte werden diskutiert:

1. Gehäuseresonanzen
2. Layout von gedruckten Schaltungen
3. Substrat-Effekte bei Streifenleitungen
4. Koaxiale Übergänge
5. Abblockmaßnahmen
6. Aktive Bauelemente
7. Netzwerke zur Speisung

## 1. Enclosure Effects and Selection

If you like surprise endings to stories, then you won't want to read this section. By this I mean that if you don't give the enclosure any thought until the circuit is operating properly on your test bench with connectors tacked onto the edges, then you may be in for a disappointing surprise when you put it into a more permanent enclosure.

If your circuit is built on microstrip, you can be assured that some of the RF traversing all those little traces will radiate into the box. The degree to which this will happen is covered in Section 3. If you have used "dead bug" construction, then you have just created a spider's web of little antennas.

This radiation can ruin an otherwise clean transmitter or LO output, cause a stable amplifier to oscillate, or at the very least cause the performance to change when the cover is installed. As described in Section 3, we can try to design our system to minimize the radiation of the circuit itself, but since nothing is ever perfect, we ought to consider the effects of the enclosure and not aggravate the situation.

The primary reason that the enclosure has any effect, is that over a range of frequencies, the typical enclosure or box will act like a waveguide. Waveguide is a very low loss transmission line, on the order of 0.4 dB per 100 feet at 2 GHz and perhaps only 4 dB per 100 feet at 10 GHz. Kent Britain, WA5VJB, has compared a typical circuit box to bolting two coaxial-to-waveguide transitions back to back and measuring the loss between the coaxial ports ([1]). Virtually zero within its operating frequency range!

As you go below its operating frequency range, a waveguide will exhibit a sharp rise in attenuation. The frequency below which this occurs is called the "lower cutoff frequency". This frequency is a function of the width of the waveguide. If we can lay out our circuit so that it's width fits within an enclosure with some "below cutoff attenuation" at the circuit's operating frequency, then we may be able to take advantage of isolation that will occur along the length of the box. Figure 1 shows the cross section of a rectangular waveguide with the equations defining the cutoff wavelength as a function of the dimensions.

The attenuation of waveguide below cutoff can be calculated using the formula below ([2]). Attenuation rises exponentially below the cutoff frequency until it reaches a maximum value. When you are far below cutoff, it is interesting to note that the attenuation is constant per unit length, regardless of how much lower in frequency you go. This principle was used by Hewlett-Packard for many years in their signal generator attenuators.

$$L = 54.5\left(\frac{d}{\lambda_c}\right)\left[1 - \left(\frac{\lambda_c}{\lambda}\right)^2\right]^{0.5} \qquad \text{[dB]}$$

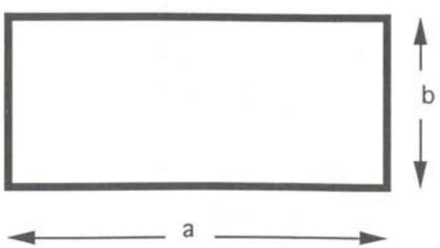
where

- $L$: attenuation in dB for a length d
- $\lambda$: operating wavelength
- $\lambda_c$: cutoff wavelength

(all in the same units as d)

How far below the cutoff frequency do we need to go to get significant effect? Not that far. At a frequency of about .66 times the cutoff frequency, we see about 75% of the maximum attenuation possible for the waveguide size in question.

As a practical example, let's assume that our circuit is a 2 stage amplifier operating at 3456 MHz ($\lambda$ = 9 cm) and has a total length of 101.6 mm from input to output connector. We have wisely chosen the width of the enclosure to be 38.1 mm. (The height of the enclosure can be 19 mm if you like to keep it in proportion to standard waveguide). The lower cutoff wavelength of this box will be 7.62 cm (f=3.94 GHz). Using the above formula, we calculate about 35 dB of input to output isolation within the box. External connections to the enclosure, for operating voltages and bias, could




| Mode | Cutoff Wavelength |
|---|---|
| TE 10 | 2a |
| TE 20 | a |

**Figure/Abb. 1**

reduce this value. If this same enclosure was used for a 2304 amplifier, the isolation would be about 59 dB.

As you can see, a proper enclosure can add significant end-to-end isolation to our circuit. What about adjacent circuits across the width of the waveguide? One answer lies in reducing the radiation and coupling across circuit boundaries. These topics are covered in Sections 2 and 3. The other involves making the waveguide more lossy through introduction of a lossy material, rather than relying solely on dimensions to determine the loss. Remember, in the above example, if you consider propagation at right angles to the length of the box, what you really have now is a waveguide that is 101.6 mm across, which will propagate 3456 MHz energy with virtually no attenuation in that direction.

Black carbon foam, of the type used to protect static sensitive ICs, has been used to line the cover of a box to introduce some loss. It has been reported that the stiffer variety material seems to be the best. Perhaps it contains the most carbon material. True microwave absorber material is normally very expensive and hard for most amateurs to obtain. Fortunately, Tom Hill, WA3RMX ([3]), has quite a large supply available at very reasonable prices. It comes in the form of a rubbery sheet which is intended to be glued to the enclosure by experiment to reduce reflections.

The lossy material will also help at frequencies above your operating frequency. At these frequencies, the enclosure will look like waveguide within its normal operating range or in various higher order modes and may show little loss. If your circuit doesn't roll off the gain fast enough above the operating frequency, there may be a frequency and enclosure length (phase shift) that allows strong coupling to occur. Your amplifier may have just become an oscillator.

In summary, the point in choosing a proper sized enclosure is to avoid making the box a part of the circuit. With a little advance planning, you should be able to choose an enclosure that will minimize this effect and keep your circuit tame.

## 1. Gehäuseresonanzen

Um böse Überraschungen zu vermeiden, sollte man von Anfang an neben dem eigentlichen Schaltungsentwurf auch über das Gehäuse dieser Schaltung nachdenken.

Hat man eine Schaltung mit Mikro-Streifenleitungen, kann man absolut sicher sein, daß alle diese Leitungen munter in die Umgebung oder in das Gehäuse strahlen. Die quantitativen Aspekte dieser Effekte werden in Kapitel 3 beschrieben. Bei unüberlegten Layouts kann man sich ein Spinnennetz von kleinen Antennen erzeugen. Die resultierende Verkopplung kann verhindern, daß Filter Nebenwellen unterdrücken, kann unstabile Verstärker erzeugen, und zuletzt auch noch Deckeleffekte produzieren. Es gibt ungeheuer viele Schaltungen, die nach dem Auflegen des Deckels nicht mehr funktionieren! In Kapitel 3 wird beschrieben, wie man die Strahlungseffekte minimiert. Nachfolgend sind einige Hinweise, wie man die Dimensionen eines Gehäuses zweckmäßig auslegt.

Jedes Gehäuse wirkt auf Mikrowellen wie ein Hohlleiter, wenn die Wellenlänge in einem bestimmten Verhältnis zur Gehäusegröße steht. Hohlleiter haben sehr niedrige Verluste, z.B. 0,01 dB/cm auf 2 GHz und 0,1 dB/cm auf 10 GHz. Liegt man mit einem Gehäuse im Übertragungsbereich, gibt es praktisch keine Dämpfung zwischen Ein- und Ausgang.

Andererseits steigt die Übertragungsdämpfung steil an, wenn man den Hohlleiter unterhalb seiner Grenzwellenlänge betreibt. Diese wird in erster Linie durch die Breite des Gehäuses bestimmt. Legt man die Platinenbreite eines Verstärkers z.B. so aus, daß das dazugehörige Gehäuse auf der Betriebsfrequenz des Verstärkers unterhalb der Grenzwellenlänge liegt, kann man von der Dämpfung zwischen Ein- und Ausgang profitieren. Liegt die Gehäusebreite oberhalb der Grenzwellenlänge, hat man mit großer Wahrscheinlichkeit einen Oszillator, sobald man den Deckel auflegt.

Die Dämpfung eines Hohlleiters unterhalb der Grenzwellenlänge, beschreibt folgende Gleichung:

$$L = 54.5\left(\frac{d}{\lambda_c}\right)\left[\,1 - \left(\frac{\lambda_c}{\lambda}\right)^2\right]^{0.5} \qquad \text{[dB]}$$

Es bedeuten:

- L: Dämpfung in dB für eine Länge d
- $\lambda$: Betiebswellenlänge
- $\lambda_c$: Grenzwellenlänge

(alles in gleichen Einheiten wie d)

Wie weit soll man nun unterhalb der Grenzwellenlänge bleiben? Da der Dämpfungsanstieg sehr steil ist, braucht man nur 33% unter die Grenzwellenlänge gehen, um bereits 75% der maximal möglichen Dämpfung zu erreichen.

Zum Beispiel soll ein 2-stufiger Verstärker für 3456 MHz ($\lambda$=9 cm) in einem Gehäuse mit 38,1 mm Breite und 101,6 mm Länge eingebaut werden. Die Deckelhöhe sei 19 mm. Die Grenzwellenlänge beträgt dann 7,62 cm (f= 3.94 GHz). Unter Benutzung der obigen Formel kann man eine Dämpfung von 35 dB vom Eingang auf den Ausgang ausrechnen. Externe Verbindungen wie z.B. Durchführungskondensatoren können diese Werte noch weiter reduzieren. Wenn man das gleiche Gehäuse für 2304 MHz benutzen würde, hätte man bereits eine Isolation von 59 dB.

Die Auswahl der richtigen Gehäuseabmessungen bestimmt die erreichbare Isolation von einem zum anderen Ende. Eine weitere Methode, die Isolation zu erhöhen, besteht darin, den Hohlleiter 'verlustreich' zu machen. Das kann durch Einfüllen von mit Graphit gefülltem Schaum geschehen. Damit wird die Dämpfung vor allen Dingen für die höheren Moden erhöht. Nicht jedes Material ist geeignet. Der Widerstand, gemessen über eine Strecke von 1 cm, sollte im k$\Omega$-Bereich liegen. Hochohmige Werkstoffe enthalten zuwenig Graphit.

Wesentlich besser ist professionelles Mikrowellenabsorber-Material geeignet. Es wird als gummiartiges Material mit ca. 1 mm Dicke hergestellt und enthält manchmal auch Ferritwerkstoffe. Es ist sowohl breitbandig als auch abgestimmt auf einzelne Bänder, z.B. dem X-Band, erhältlich. Diese Materialien sind sehr effektiv, aber leider ziemlich teuer. Das schränkt ihre Verwendung bei Amateuren drastisch ein.

Das Absorbermaterial hilft auch bei Frequenzen, die höher als die Betriebsfrequenz sind. Dort können verschiedene Hohlleiter-Moden angeregt werden, die unbedingt gedämpft werden müssen, falls der Verstärker dort noch Verstärkung hat.

## 2. Printed Circuit Layout and Crosstalk

This topic is related to the previous one, except that the phenomenon is more localized. It is usually not too affected by the enclosure, except where the enclosure walls or cover are reflecting radiated energy to another part of the circuit. If this is the case, some lossy material glued to the surface could cut down the strength of the reflected energy as described in the previous section.

Coupling is going to be more of an issue if the circuit radiates energy into the space around it.

**FRACTIONAL RADIATED POWER VERSUS SUBSTRATE THICKNESS (Zo=50 ohms, $\varepsilon_r$ = 2.50)**

| Normalized Thickness | Substrate Thickness [mm] @ Freq. [MHz] | | | | | Radiated Loss [%] | |
|---|---|---|---|---|---|---|---|
| $h/\lambda_0$ | 1296 | 2320 | 3456 | 5760 | 10368 | Exper. | Theory |
| 0.0054 | 1.24 | 0.69 | 0.47 | 0.28 | 0.16 | 12 | 9.5 |
| 0.0061 | 1.42 | 0.79 | 0.53 | 0.32 | 0.18 | 13.6 | 12 |
| 0.0081 | 1.87 | 1.05 | 0.57 | 0.42 | 0.24 | 19 | 20.7 |
| 0.0093 | 2.15 | 1.21 | 0.81 | 0.49 | 0.28 | 22.7 | 26.4 |
| 0.0107 | 2.47 | 1.39 | 0.93 | 0.56 | 0.32 | 32 | 39.6 |
| 0.0160 | 3.71 | 2.09 | 1.39 | 0.84 | 0.48 | 68 | 63.5 |

**Figure/Abb. 2**

Circuits built dead-bug style have the greatest potential for this. Leaded bias components feeding microstrip circuit elements have given me trouble in the past. Microstrip on thin dielectrics of high dielectric constant have the least potential as shown in the next section. Other types of construction, like stripline (upper and lower ground planes) is better yet, but has not been used much by amateurs due to the difficulty of integrating active devices within the circuit.

It would seem quite obvious that portions of a circuit which need isolation from each other, whether build "dead-bug" or printed circuit, ought to be given some physical separation. In commercial equipment, elaborate labyrinth type milled-out enclosures are often used to achieve excellent isolation. The dimensions of the "channels" in these enclosures can follow the guidelines in the previous section to keep unwanted RF from propagating through them. This type of construction is beyond the means of most amateurs, but there may be a clever way to make something similar using readily obtainable materials. I throw this out as a challenge for someone for the next Microwave Update Conference.

The usual solution, especially for a one-shot project, is to build each stage in its own little box, if you don't mind the extra cost of diecast boxes, connectors and cables. This will solve many potential problems but takes lots of extra time as Rick Campbell, KK7B, found. He built his first couple of no-tune microwave transverters this way. Every filter, mixer, gain stage, etc. was in its own little box made of hobby brass. Using SMA connectors and .086" semi-rigid coax resulted in a small enough assembly to make it a true mountaintopping rig as Rick demonstrated, and the performance of the rig was exceptional.

An example of the other extreme, where all functions are combined on one printed circuit board, is the no-tune transverters. Some sacrifice in ultimate performance is inevitable to achieve the simplicity of construction and packaging, but is acceptable for such lightweight and reproducible equipment.

In my own experience, I have not always given enough thought to layout. At times, experimental circuits just seem to "grow". For example, if you want to have the input and output connectors appear on the same end of a box for convenience it would be tempting to wrap the circuit into a "U" shape. If a frequency conversion occurs along the way, you are probably OK, but if not, watch out! It may be better to run some small coax to the opposite end of your circuit and use a shielded output connector (bulkhead type) to get input and outputs to appear physically close to each other.

## 2. Layout von gedruckten Schaltungen

Dieses Thema umschließt die Problematik der Abstrahlung von Stripline-Elementen und die Verkopplung von verschiedenen Schaltungsteilen. Diese wird gewöhnlich nicht vom Gehäuse beeinflußt, es sei denn, es findet eine direkte Reflektion über eine Gehäusewand statt. Dann hilft, wie oben erwähnt, nur noch Absorbermaterial.

Die Verkopplung zwischen Schaltungsteilen muß durch geeignete Maßnahmen verhindert werden. Dazu gehört sicherlich ein minimaler physikalischer Abstand zwischen Bauelementen. Auch die Bauhöhe von Bauelementen über der Platine kann wichtig sein. Das impliziert die Verwendung von SMD-Bauelementen. Bei Streifenleitungen ist die Kopplung sowie die Abstrahlung bei gegebener Dimension von der Dielektrizitätskonstante des Materials abhängig. Je höher die Dielektrizitätskonstante desto geringer sind die Effekte.

Eine brutale Lösung besteht darin, jedes einzelne Detail in ein extra Gehäuse zu bauen und mit Semirigid-Kabel zu verbinden: Vorverstärker, Mixer, Filter usw. Das wurde z.B. von Rick Campbell, KK7B, bei seinem ersten Mikrowellentransverter so gemacht.

Das andere Extrem ist es, alles auf eine Platine zu bauen. Die Nachteile in Form von höheren Nebemnwellen und anderen Effekten wird durch die kompakte und leichte Bauweise aufgewogen.

In meiner eigenen Erfahrung habe ich häufig nicht genug Sorgfalt auf das Layout der Schaltung verwandt. Irgendwie scheinen auch experimentelle Schaltungen zu 'wachsen'. Wenn man z.B. denkt, man sollte die Buchsen für Ein- und Ausgang auf einer Seite haben, 'wächst' daraus automatisch ein U-förmiges Layout. Das muß aber nicht unbedingt optimal sein.

## 3. SUBSTRATE EFFECTS AND SELECTION

I have built some microwave equipment where I could measure the effects of microstrip radiation(4). I finally got curious enough to see if there was any design data available that would give me some guidance as to how to minimize this radiation in future projects. I looked back through about 20 years of IEEE Transactions on Microwave Theory and Techniques and found lots of theoretical papers for understanding why radiation occurs, but little in the way of actual measured data. Fortunately I found a real nugget in a paper by Denlinger ([4]), where microstrip losses were measured and compared to theory. As a bonus, measured radiation losses were shown for Teflon substrates which are the most common types used so far by the microwave amateur community.

The amount of power radiated by a microstrip is primarily a function of the dielectric thickness and the dielectric constant. Thicker dielectrics and lower dielectric constants will radiate most. To help quantify this relationship, I have taken some of the test data from the Reference [5] and added some dimensional data for comparison. This is shown in Figure 2. For the thickest dielectrics shown, the radiation losses were over 60%. I can't think of too many applications except microstrip antennas where we would want to radiate over 60% of the applied power.

What would be a reasonable percent radiation that we should accept? I know from experience with the 2304 and 3456 MHz no-tune transverters on 0.79 mm TFE board that the "cover effect" (due to radiated fields) is evident on the 3456 MHz unit and barely noticeable on the 2304 MHz unit. Referring to Figure 2, this might suggest that we could live with 12-13% radiation (.006 l thickness). It would follow that 1.57 mm TFE would be a good choice for 1296, 0.51 mm for 3456, etc. If we want to play at 10 GHz, we ought to be prepared to deal with some flimsy material, or we can raise the dielectric constant somewhat as described below.

Another way to reduce microstrip radiation is to raise the dielectric constant. Figure 4 shows the effect of changing the dielectric constant keeping the normalized thickness, $h/\lambda_0$ , constant. I have included a table to help you reference this to various substrate thicknesses on several microwave amateur bands. Notice that the radiation losses are halved between each step in dielectric constant, from 2.5 to 6.0, and from 6.0 to 9.0. Going to higher dielectric constant materials has another benefit. In the section on enclosures, it was shown that optimum enclosure sizes start to squeeze the space available for your circuit. A 10 GHz preamp, for example, might do well to use an enclosure no more than about 12.7 mm wide (WR-51 waveguide size). Getting matching stubs and bias decoupling networks to fit into such a small space is going to be tough. Fortunately, the high dielectric

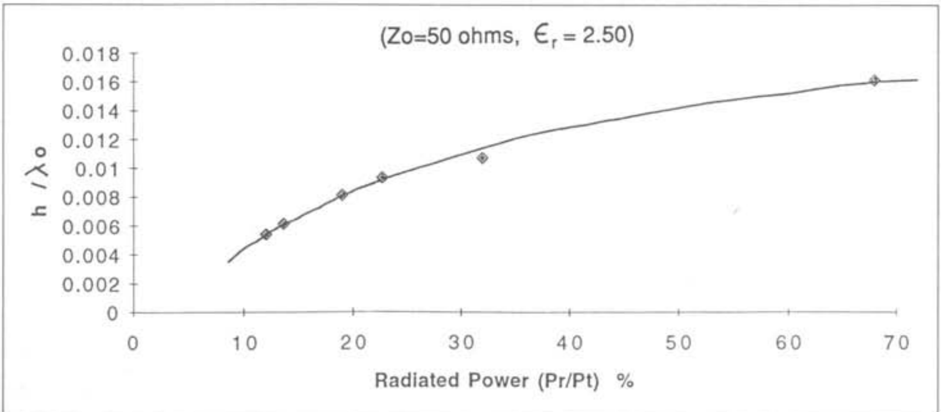



**Fig./Abb. 3: Microstrip Radiation vs Dielectric Thickness**

constant materials results in smaller physical sizes for microstrip elements, helping the designer to compensate for the shrinking box.

The third way to reduce radiation from microstrip is to avoid the microstrip discontinuities that radiate the most. Figure 5 has been condensed from Reference [5] to show the most common microstrip elements and their relative tendencies to radiate. The "form factor" in the title refers to a constant for calculating the radiation by formula in Reference [5] and is not important to this discussion. The emphasis here is on the relative differences between discontinuities. The 90 degree corner and the open circuit are the worst offenders by far. Open circuited stubs and microstrip filter elements would fall into these categories. Try a tiny probe (3.2 mm of center conductor sticking out of a length of .141 semirigid coax) and a spectrum analyzer on an operating circuit if you don't believe this.

Hopefully, experimenters will consider this information in the early design stages of their next project, helping to contribute to the overall success and reproducability of the final product. It may require some new ideas for packaging. In the commercial world, low $\varepsilon_r$ dielectrics like Rogers Duroid 5880 are very widely used with packaged devices and solder bonding, and when size is not an overriding factor. These substrates are also the lowest cost. When thin substrates are required, they are usually bonded to a metal backing to stiffen them. Without the backing, slight flexure of the board would probably crack the chip components or overstress the leads of semiconductors. Clever and inexpensive mechanical designs are needed to overcome this problem and allow the amateur use of the thinner substrates.

## 3. Substrat-Effekte bei Streifenleitungen

Ich habe einen Mikrowellentransverter gebaut, in dem ich die Effekte von Abstrahlung der Streifenleitungen messen konnte ([4]). Schließlich wurde ich sehr begierig zu erfahren, ob es irgendwelche Methoden gibt, diese Abstrahlung zu verringern. Dazu habe ich 20 Jahrgänge 'IEEE Transactions on Microwave Theory' durchgesehen. Das meiste war nur Theorie. Dann aber fand ich ein Goldstück in Form des Artikels von Denlinger ([5]), der Meßergebnisse und Theorie bezüglich der Abstrahlung von TEFLON-Substraten vergleicht.

Im Prinzip ist der Anteil an abgestrahlter Leistung eine Funktion der Dielektrizitätskonstante und der Dicke des Substrats. Die Abstrahlung ist umso höher, je dicker das Material ist und je kleiner die Dielektrizitätskonstante ist. Ich habe die Testschaltunge aus [5] und deren Resultate in Abb. 2 zusammengefaßt. Die untere Reihe zeigt eine Abstrahlung von 63 % für eine Materialdicke von 0,48 mm auf 10 GHz. Ich denke, daß 63 % zwar gut für die Konstruktion einer Streifenleitungsan-

**FRACTIONAL RADIATED POWER VERSUS SUBSTRATE DIELECTRIC CONSTANT**
**(Zo=50 ohms, $h/\lambda_0$ = .009)***

| Substrate Material | Rel. Dielectric Constant $\varepsilon_r$ | Radiated Loss % | |
|---|---|---|---|
| | | Exper. | Theory |
| TFE/Glass | 2.50 | 22.7 | 26.4 |
| Ceramic/TFE | 6.0 | 14.0 | 12.0 |
| Alumina | 9.0 | 4.0 | 5.7 |

* Corresponds to dielectric thickness as follows:

| | | | |
|---|---|---|---|
| 1296 MHz | 2.08 mm (.082") | 2304 MHz | 1.17 mm (.046") |
| 3456 MHz | 0.79 mm (.031") | 5760 MHz | 0.46 mm (.018") |
| 10368 MHz | 0.28 mm (.011") | | |

**Figure/Abb. 4**

tenne aber weniger gut für einen Vorverstärker sind.

Nach meinen Erfahrungen ist eine Abstrahlung von 10...15 % tolerierbar. Das impliziert Materialdicken für TEFLON von weniger als 1.57 mm auf 1,3 GHz, weniger als 0,5 mm auf 3456 MHz und schließlich weniger als 0,2 mm auf 10 GHz!

**Figure/Abb. 5**

| RADIATION FORM FACTORS FOR MICROSTRIP DISCONTINUITIES | | |
|---|---|---|
| **Microstrip Element** | $\varepsilon_r$ = **4.50** | $\varepsilon_r$ = **2.25** |
| Open Circuit* | 0.59 | 1.07 |
| Short Circuit | 0.05 | 0.25 |
| 90 Degree Corner* | 0.29 | 0.61 |
| T-Junction | 0.15 | 0.35 |

* Worst Offenders

Eine andere Möglichkeit, die Abstrahlung zu verringern, ist die Erhöhung der Dielektrizitätskonstante. Abb. 4 zeigt den Effekt der Erhöhung der Dielektrizitätskonstante bei konstanter Materialdicke. Die Verlust werden jeweils halbiert, wenn man von $\varepsilon_r$=2,5 (PTFE/Glas) auf $\varepsilon_r$=6 (PTFE/Keramik) und $\varepsilon_r$=9 (Aluminiumoxyd) geht.

Das legt die Verwendung von Material mit hoher Dielektrizitätskonstante nahe. Ein weiterer Grund besteht darin , daß sich bei hoher Dielektrizitätskonstante die Abmessungen der Schaltung verringern, so daß man leichter die schmalen Gehäuse realisieren kann, die man wegen der Hohlleiter-Grenzwellenlänge braucht. Für einen 10 GHz Verstärker ist z.B. eine Gehäusebreite von maximal 12,7 mm zulässig, um eine brauchbare Isolation vom Eingang auf den Ausgang zu erzielen.

Die dritte Möglichkeit, eine Verringerung der Strahlung zu erreichen, besteht in der Vermeidung von bestimmten Bauelementen. Abb. 5 zeigt die gebräuchlichen Streifenleitungselemente und ihre relative Tendenz zur Strahlung. Der 90°-Winkel und die offene Stichleitung sind die schlimmsten Strahler. Das bedeutet, daß speziell Streifenleitungsfilter besondere Kandidaten für Abstrahlung sind. Wer das nicht glaubt, halte mal eine Probe - 3,2 mm freier Innenleiter aus 0,141" Semirigid - angeschlossen an einen Spektrumanalysator in eine solche Schaltung.

Ich hoffe, daß die Schaltungsentwickler unter uns diese Hinweise annehmen, um bessere Schaltungen für die Selbstbauenden zu erzielen. Das fordert neue Ideen für Gehäuse - und Substrattechniken. In der kommerziellen Welt wird Rogers RT-5880 trotz niedrigem $\varepsilon_r$ verwendet, weil es billig ist. Das niedrige $\varepsilon_r$ erzwingt die Verwendung von dünnem Material. Bei dünnem Material ist es notwendig, die Platine auf eine Metallfläche zu montieren, damit es nicht zu Brüchen und Bauelementschäden kommt. Da fehlen noch gute Ideen.

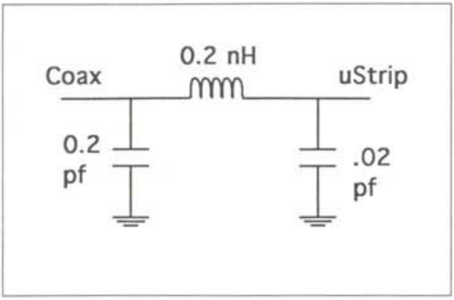
## 4. Coaxial Transitions

Coaxial transitions should present a constant 50Ω impedance to the circuit. If not, an impedance mismatch occurs at that point. This may not make much difference if you can tune the stage before or after the transition. And it may not make much difference either if the frequency is low. But what about a mm-wave circuit that was designed and optimized on one of the microwave simulation programs that some amateurs have access to through their employer. Normally those designs are assumed to look into 50Ω source and loads. Introducing a "bump" in the line feeding this optimized circuit can change the matching enough to make a measurable difference and force you to re-tune the circuit once it is in its final system.

While entire textbooks have been written to cover every type of transition ([6]), I only investigated the effect of the popular edge-mounted SMA connector on a 10 GHz preamp. The transition model is a pi-network equivalent published in 1981, [7]. This simple model is shown in Figure 6 along with the equivalent component values for the elements of the pi-network.

***Comment by Editor:*** *These values depend on the type of SMA-connector used. A special microstrip SMA-launcher has nearly no influence. The standard SMA-connector with 1.27mm (50mil ) center conductor and PTFE extrusion was measured by Dieter Briggmann, DC6GC. The transition to a 50Ω*

**Figure/Abb. 6**




*microstripline on RT-5870/0.508mm material exhibits a series inductance of 0.3nH and a parallel capacitance of 0.07pF at the stripline side and zero capacitance at the coax side. This model fits the measurement data in good agreement up to 15GHz but is quite different from the model above. It's important to know what type of connector has been modelled. For the standard SMA-connector the model in fig. 6 does not seem to be adequate.*

The circuit was modeled on Touchstone™ and was optimized for a minimum noise figure of 1.26 dB. Prototypes of the preamp showed that the best noise figure that could be measured was a bit higher at 1.5 dB. Inserting the transition model in front of the original preamp model caused a mismatch at the input and interestingly enough showed a 10.368 GHz noise figure about equal to the average measured value. The matching network of the preamp was then reoptimized for a minimum noise figure of 1.25 dB with the connector model included.

The effect of the edge-mounted connector was investigated at lower frequencies. Its effect is just noticeable on 5760, and is nearly transparent at all bands below 3.5 GHz. While some may say that the above represents a case of "splitting hairs", amateurs who venture into the mm-wave region can take such effects into account for optimal performance. The simple pi-network model described makes this easy to do with a Smith Chart or modern design software.

## 4. Koaxiale Übergänge

Koaxiale Übergänge sollen der Streifenleitung eine Impedanz von 50Ω ohne Impedanzsprung anbieten. Ist das nicht der Fall, gibt es ein Problem mit Fehlanpassung. Wenn die Frequenz niedrig ist oder die Schaltung abgestimmt werden kann, ist das kein Problem. Entwirft man aber die Schaltung als fest abgestimmte Schaltung mit Hilfe von CAD, muß man die Charakteristik eines Streifenleiter-Koax Übergangs kennen.

Darüber gibt es ganze Lehrbücher. Für einen SMA-Connector wurden die Werte für das Modell in Abb. 6 bestimmt. Das Modell wurde 1981 in [7] veröffentlicht.

***Kommentar vom Editor:** Diese Werte hängen stark von dem Typ der SMA-Buchse ab. Eine spezielle Mikro-Streifenleiter Buchse hat fast gar keine Fehlanpassung. Für eine Standard-Buchse mit 1,27 mm Innenleiter im Übergang auf RT-5870/0,5 mm Duroid wurden von Dieter Briggmann, DC6GC, eine Serieninduktivität von 0,3nh und eine Parallelkapzität von 0,07 pF auf der Streifenleitungsseite bestimmt. Eine Parallelkapazität auf der Koaxseite - warum auch? - ist nicht enthalten. Die Kapazität auf der Streifenleitungsseite ensteht durch den Lötzinnklecks und die große Dicke des Innenleiters. Das obige Modell mit seinen Werten erscheint mir daher für die normalen SMA-Buchsen nicht adäquat.*

Um den Einfluß der Fehlanpassung zu bestimmen, wurde mit Touchstone™ ein 10 GHz Vorverstärker entworfen. Die Simulation ergab eine Rauschzahl von 1,26 dB, die Messung lag höher mit 1,5 dB. Nachdem das obige Modell in die Rechnung einbezogen wurde, konnte die veränderte Schaltung mit 1,25 dB gemessen werden.

Der Einfluß der SMS-Buchsen ist auf 5760MHz gerade feststellbar. Auf 3456MHz und darunter ist der Einfluß vernachlässigbar.

## 5. Bypassing

Here's a subject that has been around a while. I can remember reading about frequency-selective bypassing in an old 1965 ARRL VHF Handbook. There it was described how you could use a little "extra" lead on various disk capacitors to make a series resonant bypass that would make the bypassed point cold to RF at the operating frequency of the circuit.

Not much has changed in 30 years except that now ceramic chip caps are the norm for microwave circuits. Some parasitic inductance is still there even if we can't see leads anymore. A quick check of the ATC Capacitor Handbook shows series resonant frequencies for a range of chip cap values.

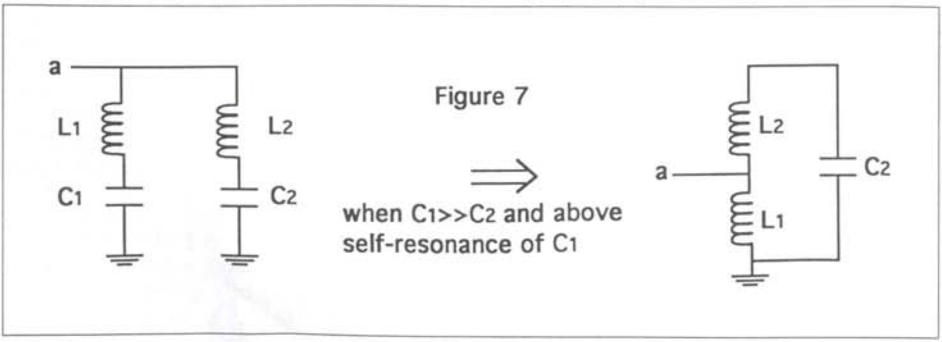
From this the equivalent series inductance can be calculated. A typical series inductance for .050" size chip caps is .25-.30 nH, and about .40-.50 nH for the larger .10" variety. The new ARRL Microwave Experimenters Handbook has a nice write-up on using this inductance and the chip's capacitance to make a series-resonant bypass so I won't repeat that information here, ([8]).

What I haven't seen addressed is the common practice of multiple bypassing, i.e., using several values of capacitance in parallel to provide a good bypass over a very wide range of frequencies, both above and below the operating range of the circuit. The need to bypass at lower frequencies is fairly standard, since most circuits with gain have even more gain at lower frequencies, unless it is purposely rolled off, and instability can result. Bypassing above the operating frequency may also be necessary.

For your chip capacitor bypass, if you go far enough above its series resonance frequency, there is point where the capacitor exhibits a parallel-like resonance([9]). The single capacitor bypass may not provide an adequate RF short at this higher frequency. If your circuit still has lots of gain, you could have a problem. In theory, paralleling a smaller value capacitor across the first, which is operating at or below its series resonance point, would bypass the circuit at this higher frequency. Reference [9] shows that this parallel resonance occurs about 3 times the series resonance frequency of the chip capacitor. If you know the characteristics of your chip caps, you could choose a value that puts this smaller capacitor's series resonance near the parallel resonance of the first. Assuming the chip caps were all of the same parasitic inductance, this would require a capacitance of 1/9 the capacitance of the larger capacitor. But since we usually do not know this much about the bypass capacitors we use, it is fairly common to use values that are about one (x10) or even two (x100) orders of magnitude apart. For instance, 100 pf and 10 pf. On the low frequency side, x10 to x100 is fairly common, i.e. .001 uf or .01 uf.

The above description of multiple bypasses sounds deceptively simple. While trying to circumvent the "parallel resonance" of each capacitor at higher frequencies, or reduce the capacitive reactance of the bypassed point at low frequencies by paralleling a larger capacitor, we may be unknowingly creating other parallel resonances. Referring to Figure 7, we see that the parasitic inductance of the larger capacitor creates a condition for parallel resonance with the smaller value capacitor at a frequency below the series resonance of the small value capacitor. This circuit was modeled on the computer using both "ideal" components and real-life parts. The result was that with the ideal capacitors (infinite Q, no resistive losses), there is a sharp resonance condition that effectively lifts the bypassed point well above ground, up to the impedance of the external circuit. You might approach this condition with the highest quality porcelain chip caps. With more common ceramic caps, especially for the larger value capacitor, the higher effective series resistance will lower the Q of the circuit somewhat. Some added resistance in series with the larger capacitor would be good insurance so that you do not create a new problem in the process.

Below 6 GHz my recommendation would be to use a high quality porcelain capacitor at its series




**Figure/Abb. 7: Parallel Resonances in Bypassing**

resonance (or an open-circuited stub) for the operating frequency of the circuit, paralleled by a capacitor about 100 times larger for lower frequency bypassing. Put a small resistor (10-50Ω) in series with the larger value capacitor as described above. If there is an optimum value of resistance that the circuit would prefer to see at lower frequencies, you will probably not be able to determine this without resorting to a computer analysis. Rolling off the low frequency gain of the circuit with carefully chosen series coupling capacitors might be a good additional measure. Above the operating frequency, the series resonant porcelain capacitor should remain an effective bypass up to 2.5 times the operating frequency.

For both coupling and bypassing at 10 GHz and above, it would be best to use "single layer" chip capacitors. These are available from several manufacturers like American Technical Ceramics Corp. (ATC) for a very modest cost. The series inductance of these capacitors is in the .03-.05 nH range, making their series resonant frequencies very high. They should be usable up to at least 50 GHz.

## 5. Abblockmaßnahmen

Das Thema ist schon öfter behandelt worden. Wie vor dreißig Jahren gibt es immer noch eine parasitäre Induktivität und Resonanzeffekte. Für ATC-Kondensatoren in der Größe 1,27mmx1,27mm (50milx50mil) ist die Serieninduktivität ca. 0,3 nH un für die Größe 2.54mmx2,54mm beträgt sie ca. 0,5 nH. Das ARRL Microwave Experimenters Handbook beschreibt, wie man die Serienresonanz für Abblockmaßnahemn nutzen kann.

Was bisher nicht beschrieben wurde, ist das Verhalten von mehreren, parallel geschalteten Kondensatoren. Das wird angewendet, um breitbandig eine gute Abblockung zu erreichen.

Chip-Kondensatoren haben oberhalb ihrer Serienresonanz auch eine Parallelresonanz ([9]). Sie ist typischerweise auf der dreifachen Frequenz. Daher macht es Sinn, verschiedene Kondensatoren im verhältnis von 10 parallel zu schalten, z.B. 100pF, 1nF, 10nF usw.

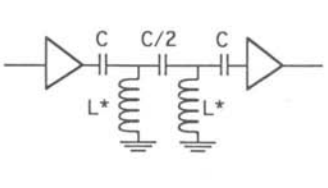
Das hört sich einfach an, ist aber möglicherweise problematisch, da neue Parallelresonanzen entstehen können. In Abb. 7 kann man sehen, daß die Serieninduktivität des größeren Kondensators mit dem kleineren Kondensator eine Parallelresonanz erzeugt, die unter der Serienresonaz des kleineren Kondensators liegt. Das ist aber im höchstem Maße unerwünscht! Der Effekt ist umso schlimmer je besser (Q) die verwendeten Kondensatoren sind. D.h. für diese Anwendung sind High-Q Kondensatoren von ATC oder Tekelec ganz ungünstig.

Meine Empfehlung für Frequenzen unter 6 GHz ist, für die HF-Abblockung eine resonante Stichleitung oder einen ATC-Kondensator in seiner Serienresonanz zu nehmen. Über einen Widerstand von 10...50Ω in Serie wird ein 100x größerer Kondensator parallel geschaltet. Damit sind alle tiefen Frequenzen abgeblockt.

Zur Kopplung und zum Abblocken auf Frequernzen oberhalb von 10GHz sind Mono-Schicht Kondensatoren geeignet. Sie haben eine Serieninduktivität von 0,03...0,05 nH und eine Serienresonanz oberhalb von 50 GHz.

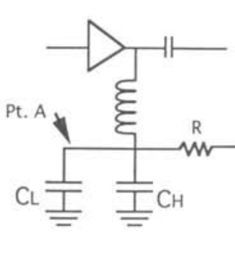
## 6. DEVICE SELECTION

GaAsFETs are available in so many different types that sometimes it is hard to know which one will



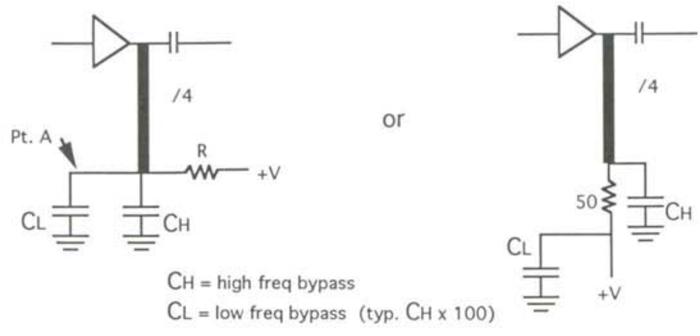

* may be done using microstrip transmission line elements for higher frequencies

**Figure/Abb. 8**




**Figure/Abb. 9**

**Figure/Abb. 10**




CH = high freq bypass
CL = low freq bypass (typ. CH x 100)

give you the desired performance AND work well in the circuit. One of the differences between FETs is the gate periphery, ranging from 250 µm to 750 µm or more. There is a relationship between gate periphery, input impedance and operating frequency range with the longer gate periphery most suitable for the lower microwave frequencies. It may be awful tempting to use a Ku-band FET (250 µm gate) for your next 2304 preamp, but you will probably have better luck using a 500 or 750 µm device. As a general rule of thumb, a 750 µm gate is preferred for the 500 MHz to 2 GHz range, 500 µm for 2-6 GHz and 250 µm for 6-16 GHz. There are a couple of reasons for this recommendation. One is stability, and the other is overall noise performance.

With the 250 µm devices, the input reflection coefficient for optimal noise performance is very high, making it hard to match from 50 ohms without using a lossy circuit. This will tend to negate the otherwise low noise figure of the device at the lower frequency. The lower impedance gates of the 500 or 750 µm FETs reduce the transformation ratio required and the net effect may be a better overall noise figure.

Also, it is often necessary to use a little extra source inductance with the high frequency FETs at low frequencies in order to get stability at the operating frequency and to get a better coincidence of low input VSWR and NF. High frequency stability, in the 8-12 GHz range, may be impossible to get under these conditions.

Another area where device selection can make or break your final result is with the popular MMICs. While these devices have enabled many to finally build a stable microwave amplifier, there are some precautions to observe.

Most of the problems I have had with MMICs resulted from my attempts to use them at the upper end of their operating range. You can still get useful gain out of many of them even as they are rolling off, but the danger lies in all the gain you end up with at the in the lower VHF frequency range. Depending on which MMIC you select, you can end up with so much low frequency gain that the circuit oscillates at VHF no matter how you terminate it.

As an example, assume you want 12 dB of gain at 3456 MHz, and a little power too, say 5 mW. A quick check of the Avantek Microwave Semiconductor Data Book shows that only two MMICs meet the output power requirement, the MSA 0885 and the MSA 0986. Of the two, the '0885 has enough gain by itself, but is rolling off rapidly at this frequency. Its low frequency gain is a whopping 33 dB. The '0986, on the other hand, can meet the power output requirement, but it will take two cascaded stages to get the gain. Because of internal feedback in the '09 device, it has a low frequency gain of only 8 dB. Two stages gets you a manageable 16 dB. While the '0986 is not unconditionally stable, the data sheet shows that k dips below 1.0 only below 50 MHz. A DC feed circuit that terminates the amplifier in 50Ω below 50 MHz should help here.

For lower power applications, it can be seen that nearly every MMIC in the Avantek catalog has reasonable gain at 3456 MHz, but some have a greater low frequency gain. For 8 to 9 dB gain, the '01/02/03/06 and 07 series could be considered. But the '01 and '06 versions have 18 and 20 dB of gain at VHF, respectively, where the others have about 13 dB. If the lower noise figure of the '06 is not important, then the '03 and '07 might be the best choice.

One remedy that could be considered, if a multistage circuit is desired, it to incorporate a highpass network between stages as shown in Figure 8. This has the added benefit that low frequency signals, from an antenna, LO, or whatever, will not see as much gain.

## 6. Aktive Bauelemente

Die Zahl der verfügbaren GaAs-FET's ist kaum noch überschaubar. Es ist daher schwer zu entscheiden, welcher Typ das geeignete aktive Eelment für eine bestimmte Frequenz und Anwendung ist.

Kleinsignal GaAs-FET's unterscheiden sich grundsätzlich in zwei Eigenschaften: die Länge der Peripherie des Kanals und die Kanal-Länge. Typische Werte sind 250...750 *µm* für die Peripherie und 0,25...1 *µm* für die Kanallänge. Die Peripherielänge bestimmt die Daten der optimalen Quellimpedanz für minimale Rauschzahl. Der FET ist umso hochohmiger und umso unstabiler je kleiner die Betriebsfrequenz und die Länge der Peripherie sind. In der Regel sollte man 750 *µm* GaAs-FET's für 500...2000 MHz, 500 *µm* FET's für 2...6 GHz und 250 *µm* FET's für 6...16GHz einsetzen.

Ein 250 *µm* FET ist auf niedrigen Frequenzen sehr hochohmig. Es ist folglich sehr schwierig, einen 250 *µm* FET, der für einen Einsatz auf 12 GHz konzipiert wurde, auf 2,3 GHz anzupassen. Zwar ist seine Rauschzahl niedriger, dagegen sind die Verluste im Eingangsnetzwerk wegen des hohen Transformationsverhältnisses höher. Daher kann ein Verstärker mit einem 500 *µm* FET trotz höherer Eigenrauschzahl des FET möglicherweise besser sein. Außerdem ist er stabiler.

Andere beliebte aktive Bauelemente sind MMIC's. Auch diese sind nicht ohne Probleme. Meine Probleme mit MMIC's kamen von dem Versuch, sie an ihrer oberen Frequenzgrenze zu betreiben. Dann hat man jede Menge an Verstärkung auf VHF, so daß die Kette von MMIC's schwingt.

Nehmen wir an, wir wollen mit MMIC's 12dB Verstärkung bei 5 dBm Ausgangsleistung auf 3456MHz erreichen. Ein Blick in das Avantek Datenbuch zeigt, daß der MSA-0885 und der MSA-0986 die geforderte Ausgangsleistung erreichen können. Während der 0885 die Verstärkung alleine aufbringt, muß man beim Einsatz des 986 zwei Stück kaskadieren. Die Verstärkung des 885 erreicht 33 dB auf VHF und er ist nicht unbedingt stabil. Die 986 MMIC's haben jeweils 8 dB Verstärkung auf VHF und sind oberhalb von 50 MHz unbedingt stabil. Eine geeignete Speiseschaltung kann für eine Last von 50Ω unterhalb von 50 MHz sorgen.

Für kleine Leistung kann man beinahe jeden MMIC aus dem Katalog auswählen. Für 8...9 dB Verstärkung kann man die 01/02/03/07 und 07 Serie verwenden. Während die 01 und 06 Serie ca. 20 dB Verstärkung auf VHF haben, haben die anderen ca. 13 dB. Für kaskadierte Stufen sollten Hochpass-Koppelglieder wie in Abb. 8 verwendet werden, damit die Verstärkung auf VHF gering bleibt.

## 7. DC Feed Circuits

DC feed circuits should ideally be invisible at the operating frequency so as to not affect the operating circuit's performance. At other frequencies, though, we would rather have the network look like an RF short, or maybe 50Ω. Simple choke networks as shown in Figure 9-A are common, as are transmission line versions, Figure 9-B. Both can look like 50Ω at low frequencies if a 50Ω resistor is inserted at Point "A".

The wirewound choke has the disadvantage of parasitic parallel resonances caused by the distributed capacitance between windings. This may cause the RF bypass at the "cold" end of the choke to become isolated from the circuit. Gain peaks and the potential for instability result.

The transmission line network, usually implemented on microstrip, avoids the parallel resonances and gradually disappears lower frequencies. At even multiples (x2, x4 etc.) of the operating frequency, it appears as a 1/2 line multiple and will take the operating circuit to a low impedance by virtue of the bypasses at the cold end. The microstrip feed with 50Ω in series with the VHF bypass capacitor has been found to be one of the best DC feed networks you can use, and is highly recommended.

## 7. Netzwerke zur Speisung

Speisenetzwerke sollen auf der Betriebsfrequenz keinen Einfluß haben. Auf allen anderen Frequenzen können sie entweder als HF-Kurzschluß wirken oder aber als 50Ω Last wirken. Üblich sind Drosseln wie in Abb. 9-A oder gedruckte $\lambda/4$-Leitungen wie in Abb. 9-B. Beide wirken bei tiefen Frequenzen als 50Ω Last, wenn man bei Punkt "A" einen 50Ω Widerstand einfügt.

Drosseln haben den Nachteil von parasitären Resonanzen, die durch die Wicklungskapazität entstehen. Die Leitungsvariante hat diese Resonanzen nicht und unterdrückt zudem tiefe Frequenzen. Bei geraden Vielfachen wirkt sie wie eine $\lambda/2$-Leitung, die dann den Abschluß am 'kalten' Ende - Kurzschluß oder 50Ω - an das 'heiße' Ende weiterreicht. Die Stripline-Schaltung mit 50Ω am 'kalten' Ende hat sich daher am besten bewährt.

## 8. Acknowledgements

I want to particularly thank Al Ward, WB5LUA, who has been most helpful in helping me to understand the tradeoffs involved in using microwave semiconductors in practical circuits. In his position as an applications engineer for the Avantek Division of Hewlett-Packard, he has accumulated a wealth of experience at both computer modeling and circuit construction. I also wish to thank Reed Fisher, W2CQH, for many interesting discussions on waveguide theory.

## 8. Danksagung

Ich möchte Al Ward, WB5LUA, und Reed Fisher, W2CQH, für Ihre Unterstützung und Hilfe danken.

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# 47GHz Active Doubler

*Toshihiko Takamizawa, JE1AAH*

**Abstract:** A 46 GHz active frequency doubler has been developed using conventional packaged low noise HEMT and soft-board technology instead of MMIC technology. The doubler utilizes low noise HEMT FHX05LG from Fujitsu for 23 GHz buffer amplifier and times 2 multiplier. The board used is RT/Duroid 5880, 5 mil thickness with 18 µm copper clad soft board.

**Kurzfassung:** Ein aktiver 47GHz Verdoppler benutzt gehäuste HEMT Transistoren FHX05LG von Fujitsu auf einem 5mil RT-5880 Teflon-Substrat. Ein 23 GHz Verstärker steuert einen Verdoppler auf 47 GHz an.

## Introduction

By recent performance improvement of packeged HEMT, this project has been addressed and targeted to realize millimeter wave component using consumer level products which means to utilize packaged device and soft-board. To date, there have been many papers reported regarding this frequency region's LNA, HPA and frequency doubler, etc. However all the work has been done in MMIC technology.

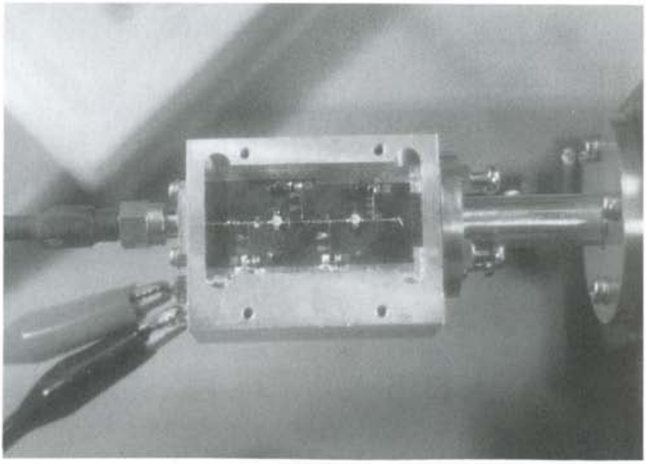
Years ago DBS receiving systems had started using MIC or MMIC technology, but now there is no product using this technology and conventional packaged device has been widely used instead. Currently, a future 23 GHz DBS system is being considered to employ MMIC technology but there are several papers reported to extend 12 GHz DBS circuit technology to 23 GHz systems.

Based on this history, I decided to develop 46 GHz components using current low cost production technology.

Figure 3 shows the block diagram of the doubler. Since there are no S-parameters published above 20 GHz by manufacturers, tunig has been done by tweeking a small piece of copper foil along with micro stripline track. Stripline to waveguide transition is done by quarter wavelengh probe.

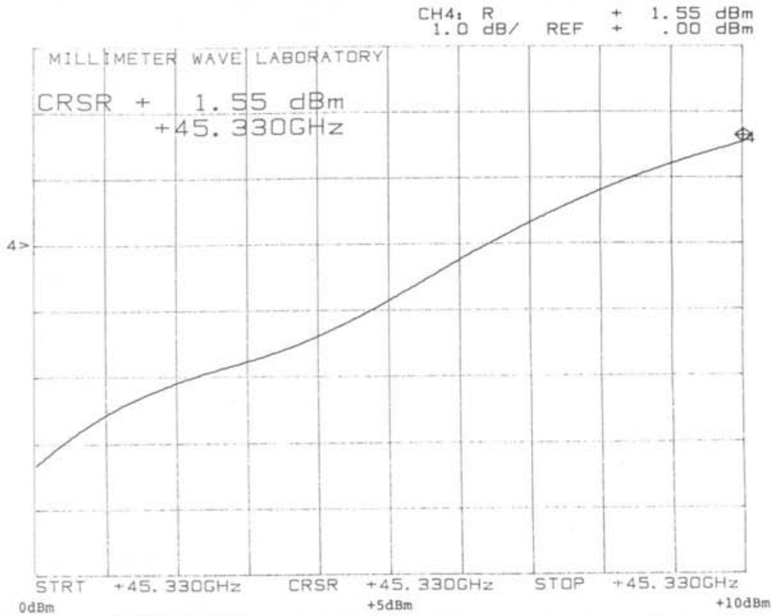
Figure 2 shows wide band output power performance at +10 dBm input level and figure 2 shows input/output conversion loss. As shown in the figures, conversion loss is less than 4 dB at low input level and less than 10 dB at saturated and high power output level. -3 dB bandwidth is more than 1 GHz at output frequency region.

Since gain of input buffer amplifier is estimated to about 7 to 8 dB, actual doubler stage conversion loss in the linear operating region is about 7 to 8 dB. This means total conversion loss is about 0 dB. In fact, the doubler could be optimised to



**47 GHz Active Doubler**

**Abb./Figure 1: Frequency Response**



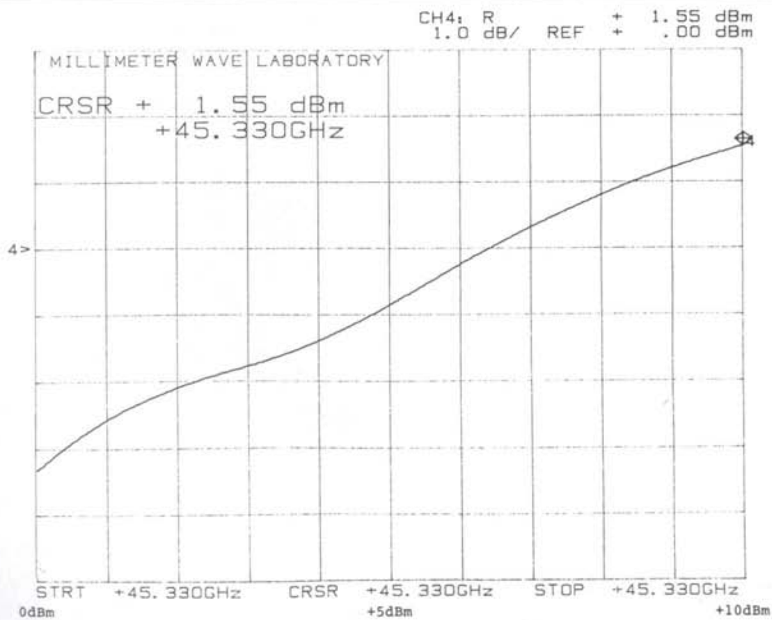




**Abb./Figure 2: Pin @ Pout**

0 dB of conversion loss at 0 dBm output power level to achieve better conversion loss. For fixed frequency application, this good conversion loss setting could be used.

For wider frequency range application, naturally packaged device is not good for this purpose due to excessive parasitic elements. Packaged device frequency response varies more than that of a chip device. However, by operating buffer amplifier and multiplier at saturated power region, it is possible to widen its operating frequency range.

**47 GHz Doubler: Top View**

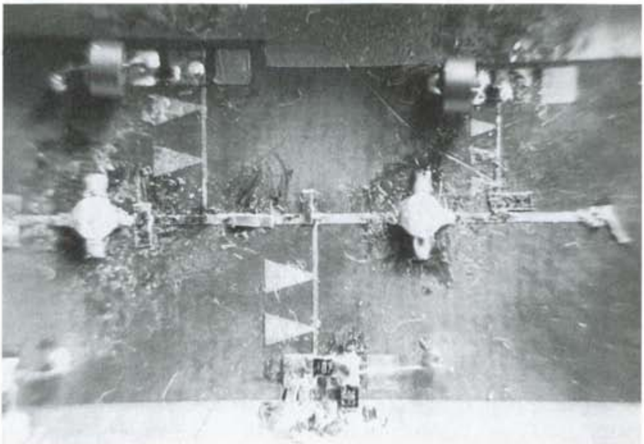


Figure 2 could be obtained using this technique.

Spurious response of the doubler for fundamental frequency it is less than -50dBc and for times 3 frequency it is less than -40dBc with wide band response setting.

To conclude a paper, the project was very successful and good performance has been obtainable to use packaged dvice on 46GHz. Next target is to develop LNA and HPA for this frequency region.

## Deutsche Version

Das Ziel dieses Projekts war, Millimeter-Komponenten zu entwickeln, die normale gehäuste FET-Transistoren und Teflon-Substrat verwenden. Bisherige Komponenten benutzten MMIC Technologie, die für Amateure unerreichbar ist. Beispielsweise kann man sehen, daß heute alle 11 GHz DBS Systeme in konventioneller Technik aufgebaut sind, obwohl die ersten Labormuster in MMIC Technik aufgebaut waren.

Abb. 3 zeigt das Schaltbild des aktiven 47 GHz Verdopplers. Da keine S-Paramater oberhalb von 20 GHZ zur Verfügung stehen, müssen die FET's in Striplines mit kleinen Abstimmfähnchen eingebaut werden. Der Hohlleiter-Übergang wird durch einen Viertelwellen-Monopol gebildet.

Abb. 1 zeigt die Breitbandausgangsleistung bei einem Eingangspegel von +10dBm. Aus Abb. 2 ist die Verstärkung bei 47GHz zu sehen. Die Verstärkung (Verlust) ist ca. -4dB bei kleiner Ausgangsleistung und ca. -10dB bei hoher Ausgangsleistung. Die 3dB Bandbreite ist ca 1GHz.

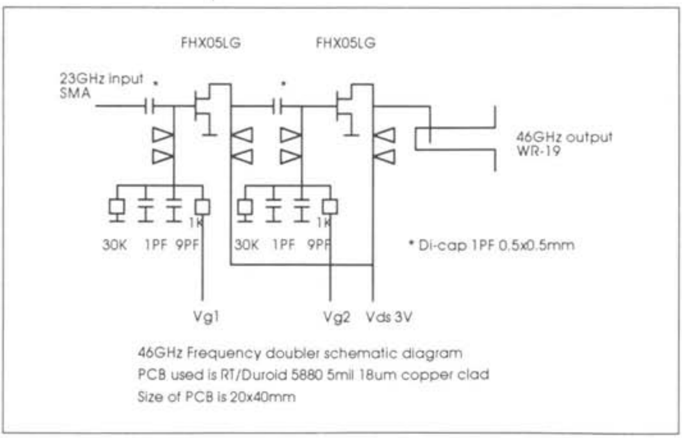



**Abb./Figure 3: Circuit Diagram**

# 10 GHZ Wolkenscatterbake

## (10 GHz Cloud Scattering Beacon)

*Frank Cronauer, LX1DU*

### Ausbreitung auf 10 GHz

Um die Ausbreitung auf 10 GHz zu untersuchen, wurde eine Versuchsreihe von mehr als 400 QSO's durchgeführt. Nach jeder Verbindung wurden Zeit, Temperatur, Luftfeuchtigkeit, Luftdruck, Wetterzustand (Witterung und Bewölkung), die Feldstärke der Gegenstation und die Feldstärken einiger Baken auf 23 und 13 cm festgehalten und mittels eines Rechners gespeichert. Die Auswertung ergab, daß bei schlechter Wetterlage die Baken auf 23 und 13 cm nur schlecht aufzunehmen, dagegen die Feldstärken auf 10 GHz ausgezeichnet waren. Damit wurde bestätigt, daß 10 GHz ein 'Schlechtwetter' Band ist. Die Grafik in Abb. 2 zeigt, daß schon bei leichter Bewölkung ein Feldstärkeanstieg von bis zu 10 dB und bei starker Bewölkung oft ein Anstieg von 25 dB zu beobachten ist. Die Entfernung zwischen den Stationen betrug fast 200 km.

Da der Feldstärkeanstieg unmittelbar mit dem Bewölkungszustand in Verbindung gebracht werden konnte, lag der Gedanke nahe, eine Bake aufzubauen, die permanent in die Wolken strahlt. Versuche mit geringer Leistung waren erfolglos. Erst die Erhöhung der Leistung auf 0,5 W bei 40 dB Antennengewinn zeigten Erfolg. Die Bake ist seit einigen Monaten unter dem Rufzeichen LX1DU auf der QRG 10,368040 MHz in Betrieb.

Die Bake besteht (Abb. 1) aus einem 96 MHz Quarzoszillator, der zwecks Temperaturstabilisierung 3m tief in den Erdboden versenkt wurde. Ein Verzwölffacher erzeugt ein Signal auf 1152 MHz, das über einen Verneunfacher auf 10,368 GHz vervielfacht wird. Eine Leistungsstufe hebt das Signal auf 0,6 W an. Über einen Hohlleiter WG/16 von 12 m Länge wird das Signal auf die 1,3 m Parabolantenne geführt. Eine automatische Tastschaltung erzeugt das Rufzeichen und die Kennung für den Standort.

Ein Reflexionsmeßgerät, daß von einer in zwei Achsen rechnergesteuerten Parabolantenne gespeist wird, sucht rechnergesteuert den Horizont nach reflektierenden Wolkenformationen ab. Hat das Programm ein Reflexionszentrum gefunden, wird die Antennenstellung fixiert und statt des Reflexionsmeßgeräts die Bake angeschlossen.

Hört man die Bake, kann man die Antenne auf maximale Feldstärke ausrichten und dann über dieses Reflexionszentrum Verbindungen suchen. Ohne Wolken ist die Bake kaum zu hören. Nicht alle Wolken haben gleiche Reflexionseigenschaften. Am besten eignen sich schwarze Gewitterwolken. Kann man METEOSAT empfangen, ist es möglich die Ankunft von geeigneten Wolkenfeldern vorauszusagen.

### Propagation on 10 GHz

To investigate propagation on 10GHz some 400 QSOs were run with DL9SH. Data including time, temperature, air pressure, cloudiness, signal level etc. were collected on a computer. The result (Fig. 2) shows, that during light overcast signal levels increases for 10 dB and during strong cloudiness levels increase for 25 dB. That's why 10 GHz is called the 'weather' band. A beacon with the call LX1DU, which directly beams into the clouds if available was erected. The TX is based on a 96 MHz oscillator, which is muliplied to 10.36804MHz with an output power of 0.6 W (Fig. 1). The 1.3 m dish altenatively feeds a radar receiver or is fed by the beacon TX. The radar RX tracks clouds via a computer and steers the antenna into this direction. After switching to the beacon TX other stations can observe the presence of scatter and optimize their antenna direction for the clouds involved. Without clouds the beacon is barely audible for the more distant stations. An access to the METEOSAT weather satellite can enable the prediction of useful clouds and their arrival time.

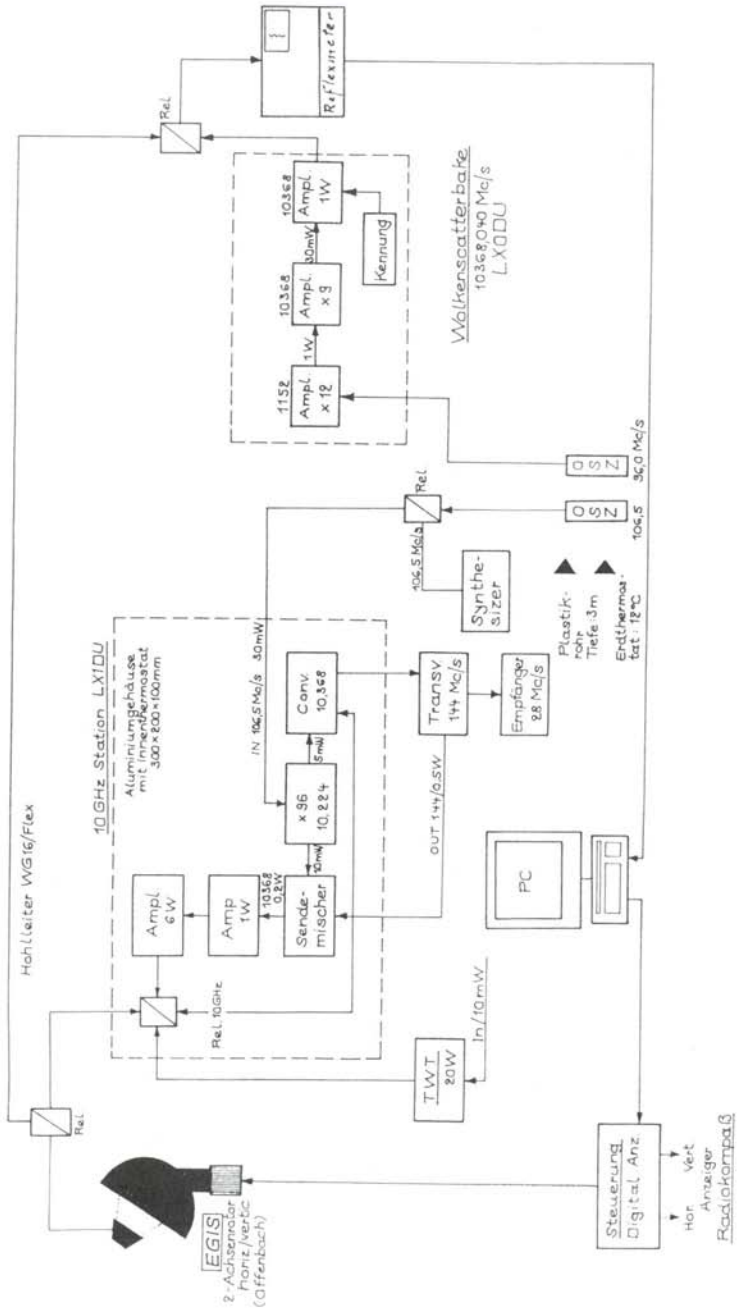



**Fig./Abb.1: Wolkenscatterbake/Cloud Scatter beacon**

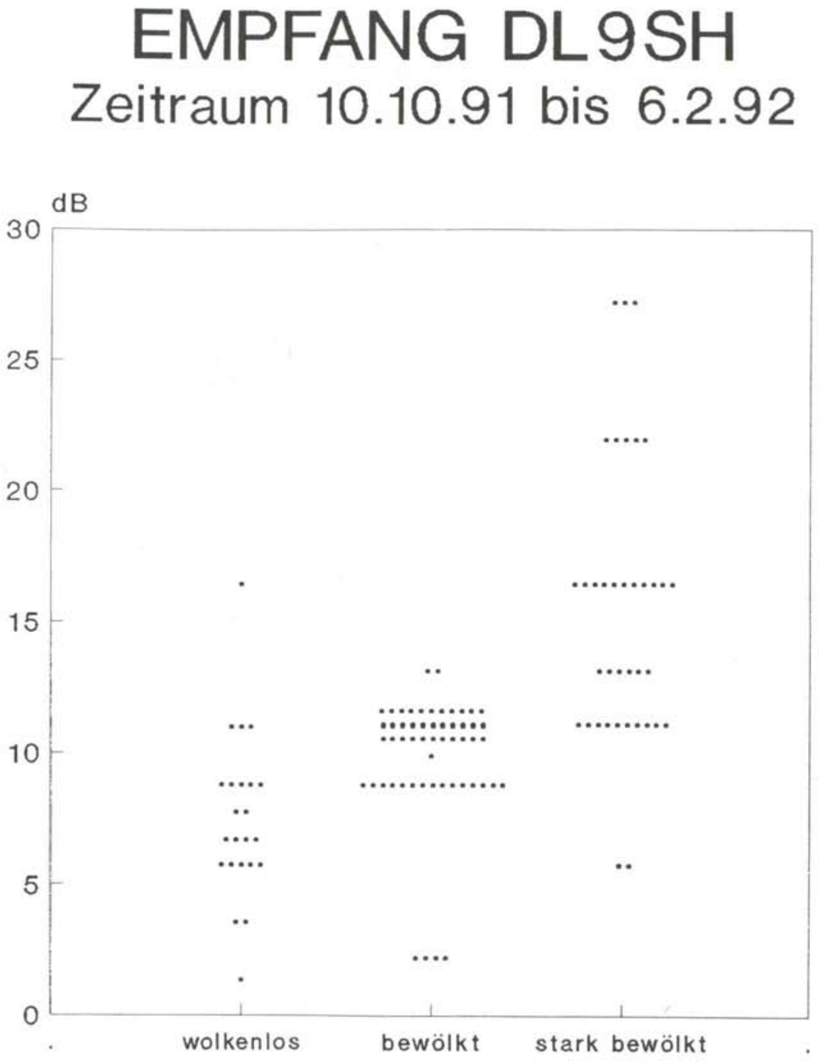



**Fig./Abb.2: Propagation vs Cloudiness**

# 20 W GaAs-FET Power on 5.7 GHz

*Philip Prinz, DL2AM*

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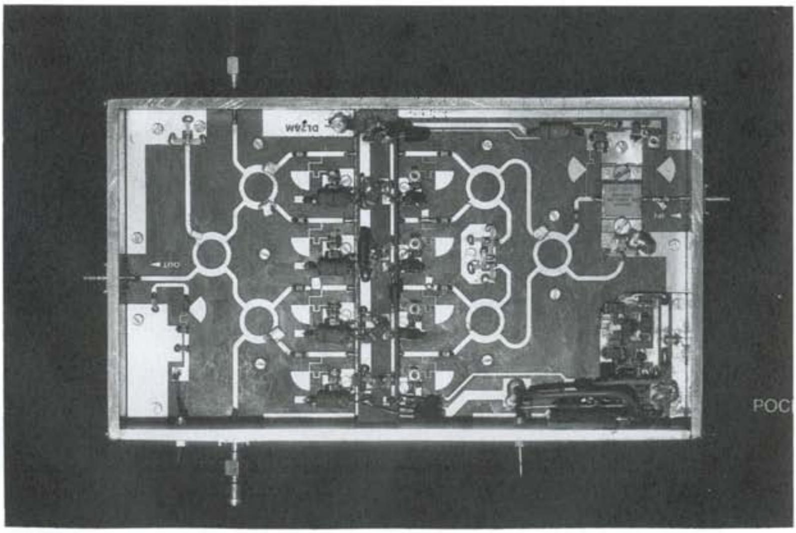
**Kurzfassung:** Der zweistufige Verstärker MT-6G20W hat auf 5,76 GHz bei einer Betriebsspannung von 12 V eine Ausgangsleistung von 20 W (bei 1 dB Kompression) und eine Verstärkung von 18 dB. Er ist mit fünf intern angepassten GaAs-FET IM5964-3 von Avantek bestückt und ist in einem gefrästen Aluminium Gehäuse aufgebaut.

**Abstract:** The two stage power Amplifier MT-6G20W provides a 1db compression output power of 20 W on 5.76 GHZ with a supply voltage of 12 V and 18 dB gain. It uses five IM5964-3 GaAs FETs from Avantek und is constructed on Teflon board in a machined aluminum box.

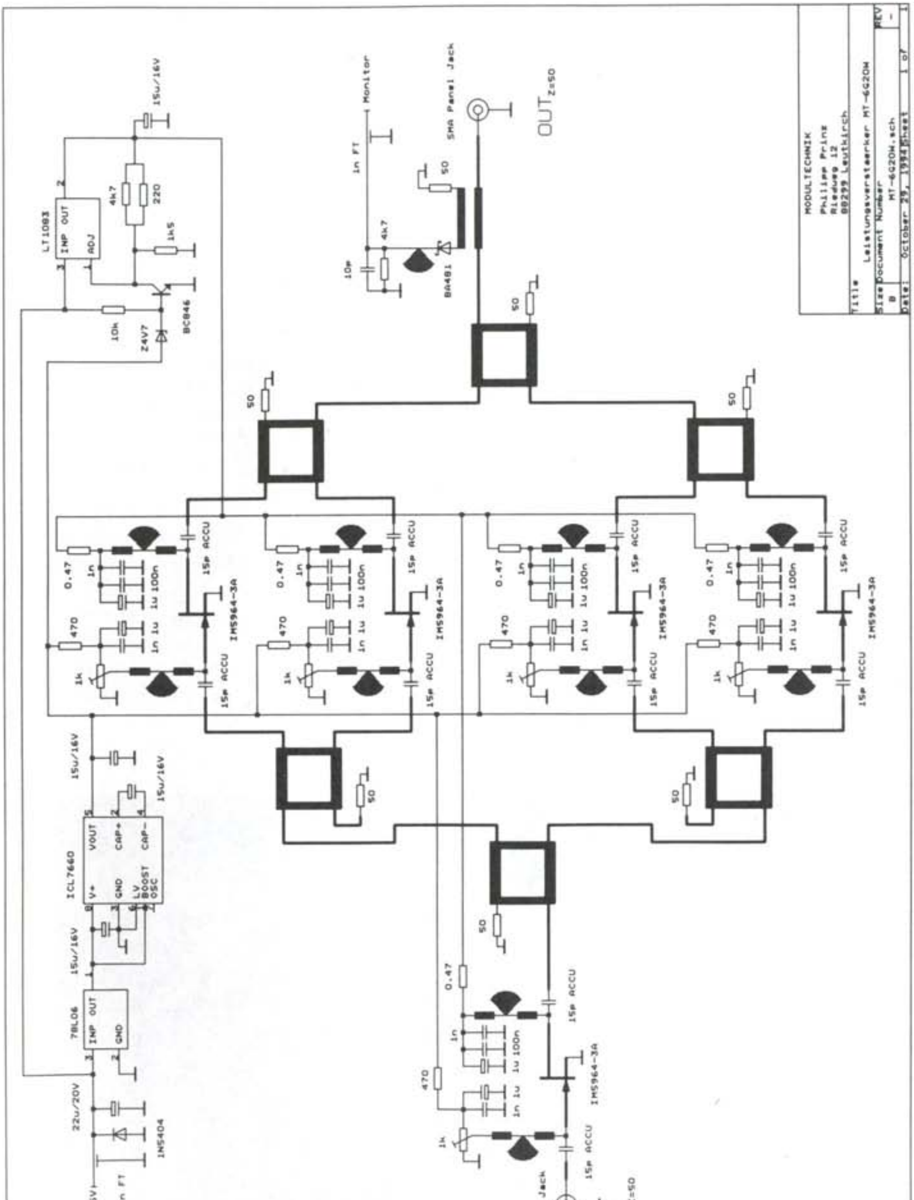
## Schaltungsbeschreibung

Intern angepaßte GaAs-FET's IM5964-3 dienen wie in der früher beschriebene Stufe ([1]) als Verstärkerelement. Nach einem Treiber folgt ein Quartett von 4 Transistoren, das über 90°/3 dB Koppler zusammengeschaltet ist. Die Koppler haben eine Symmetrie von 0,1 db und eine Eingangsrückflußdämpfung von 37 dB. Die Hybride sorgen für eine gute Anpassung und die Absorption von Reflexionen, die durch unterschiedliche Transistoren entstehen können, an den 50Ω-Abschlüssen der isolierten Tore.

Die Platine ist aus 0,5 mm starkem RT-5870 Duroid und ist mit Silberleitkleber sowie M1,4 Schrauben kontaktiert. Ein Ausgangsrichtkoppler liefert eine Gleichspannung als relative Leistungsanzeige. Die Versorgungsspannung beträgt 11,5...15 V. Sie wird intern stabilisiert. Ebenso wird die negative Vorspannung intern erzeugt. Der

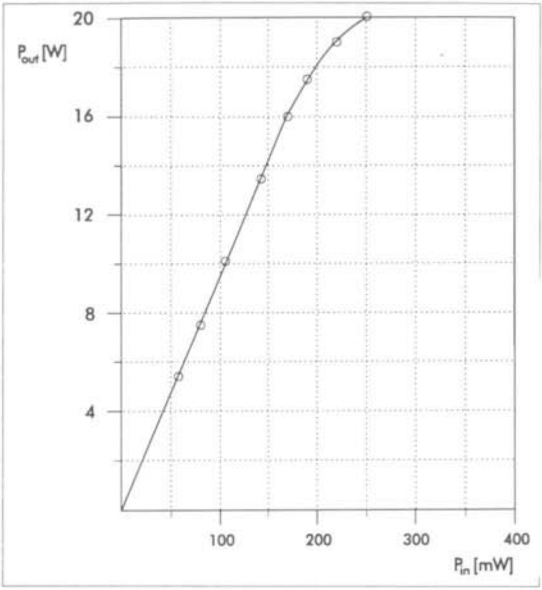


**6cm Poweramplifier MT-6G20W**




6cm Poweramplifier MT-6G20W: Circuit Diagram

**Figure 1: Output vs Input Power**




Ruhestrom beträgt 4,8 A (4x1 A für die Endtransistoren). Die Abmessungen sind 185 x 110 x 30mm.

## Description

The amplifier is constructed around internally matched power GaAs-FETs IM5964-3. Four transistors are coupled via 90°/3 dB hybrids and driven by the fifth transistor. The hybrids provide 0.1 dB symmetry and 37 dB input return loss. All reflections caused by different impedances and time delays of the transistors are absorbed in the 50Ω loads at the isolated ports.

The PCB is made from 0.5 mm RT-5870 duroid. An integrated directional coupler delivers a power monitoring DC-voltage. Size of the enclosure is 185 x 110 x 30mm. Supply voltage is 11.5...15 V. Supply current is 5.6 A. Bias current for the final transistors is 4 x 1 A. All voltages are stabilized internally.

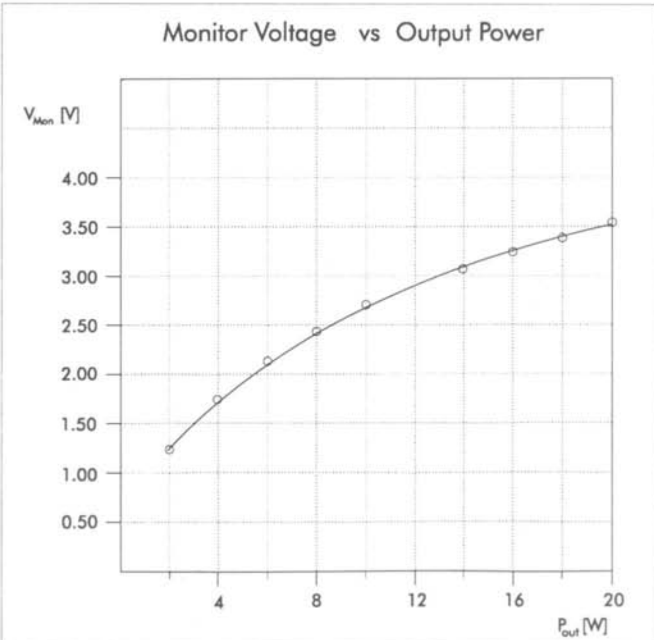



**Figure 2: Monitor Voltage**

## 4. Teile/Parts

Komplette Verstärker und Teile sind bei Philip Prinz, DL2AM, Riedweg 12, D-88299 Leutkirch 3, Tel.: (++49)-7576-294/Fax: (++49-7567-1200 zu haben.

Ready made units and parts can be ordered from Philip Prinz, DL2AM, Riedweg 12, D-88299 Leutkirch 3, Tel.: (++49)-7576-294/Fax: (++49)-7567-1200.

**6cm Power Amplifier**

| | |
|---|---|
| **Devices:** | **5xIM5964-3** |
| **Supply Voltage:** | **11.5...15 V** |
| **DC-Current:** | **5.6 A** |
| **Gain:** | **18 dB** |
| **Output Power:** | **20 W** |

# Quadrature Hybrids for 1.3GHz

*Rainer Bertelsmeier, DJ9BV*

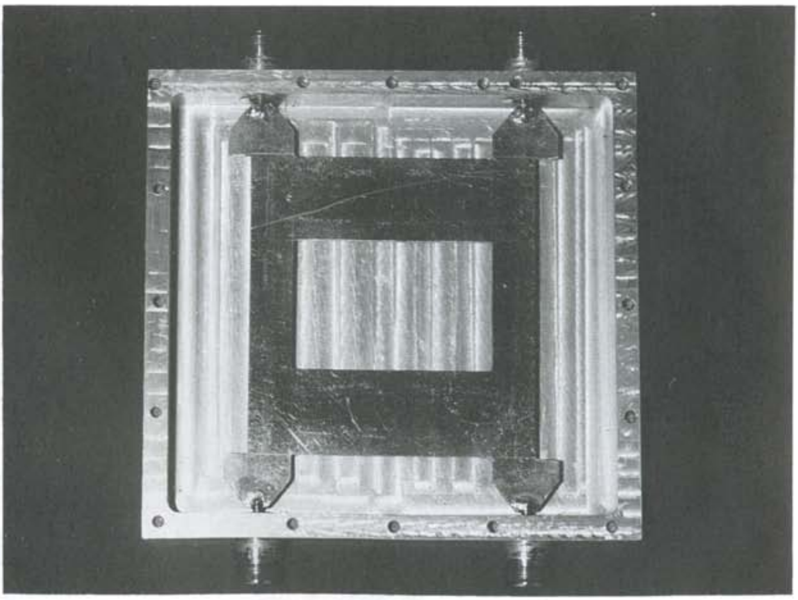
**Abstract:** Quadrature 3dB hybrids are a convenient method to combine amplifiers and to achieve circular polarisation with a pair of linear antennas. In particular the quarter-wave branch coupler in air stripline or in microstripline technique provides 90° phase shift and isolation between the output ports as well as a -3 dB coupling ratio.

**Kurzfassung:** Man kann 90°/3dB Hybridkoppler verwenden, um zwei Verstärker zu kombinieren oder um mit zwei linearen Antennen zirkulare Polarisation zu erzeugen. Sie haben einen Kopplungsfaktor von -3 dB vom Eingang auf die beiden Ausgänge. Die Phasenverschiebung zwischen den Ausgängen beträgt 90°. Außerdem sind die Aus- und Eingänge voneinander isoliert. Solche Hybride können als Viertelwellen-Ringhybrid mittels Leitungen in Streifenleitungs- oder Mikrostreifenleitungs-Technik aufgebaut werden.

## Introduction

A 3 dB branch coupler is made from a ring of $\lambda/4$ transmission lines with 50 Ω and $50/\sqrt{2}$ = 35.35 Ω impedance (Fig. 1). If port 1 is the sum port, then port 2 provides -90° phase shift and -3 dB coupling ratio. Port 3 provides -180° phase shift and also -3 dB coupling ratio. Ports 4 is isolated from port 1. If used as a power splitter/combiner, a 50 Ω load is put on port 4.

Two equations describe the behaviour in the case of load mismatch. The equation for return loss at port 1 is:



**90° Branch Coupler for high power**

[1] $RL_1 = 20 \cdot \log \frac{|\rho 2 - \rho 3|}{2}$

with $\rho = \frac{Z - Z_0}{Z + Z_0}$

If $\rho 2 = \rho 3$ holds the input return loss will be infinite!

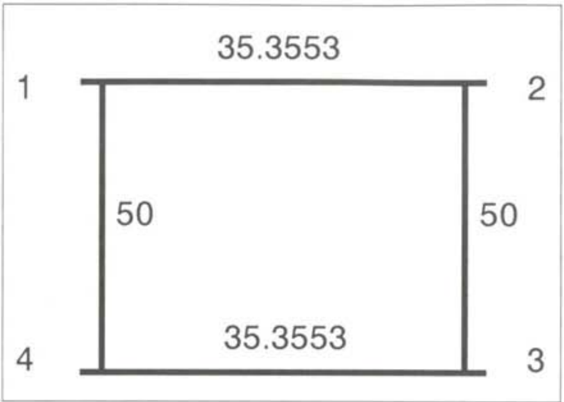
For the isolation between port 1 and 4 holds:

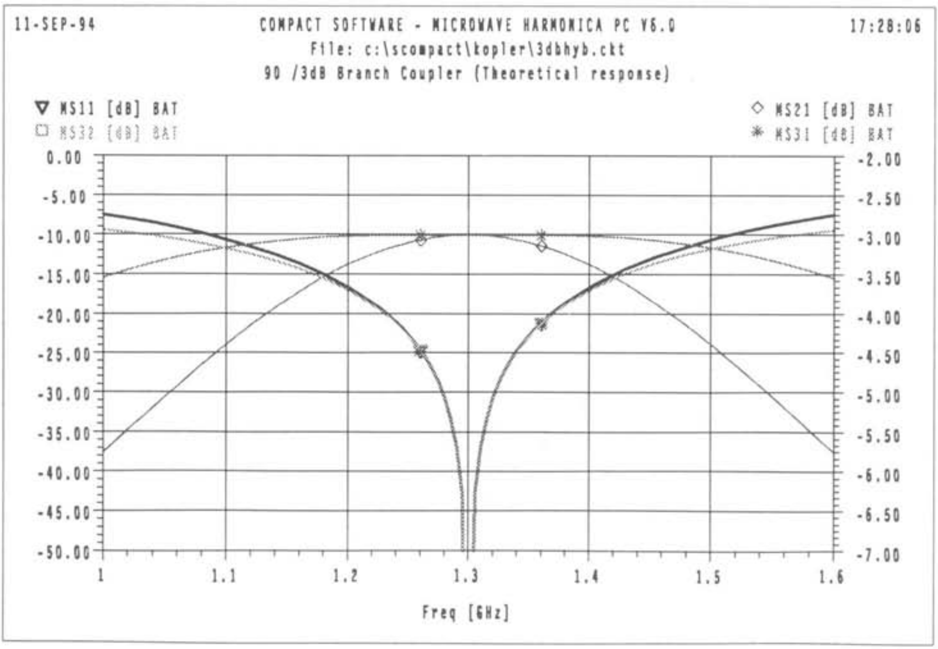
[2] $ISO_{1-4} = 6 + 20 \cdot \log \frac{1}{|\rho 2 + \rho 3|}$.

Any mismatch, which likewise applies to port 2 and port 3 will be reflected to port 4 but cancels at port 1. This means, that isolation is decreased by an identical mismatch on the coupled ports. But input VSWR is not affected in this case. For unequal mismatch also input VSWR is degraded.

These properties make this type of hybrid suited to use them as input and output combiners of two amplifiers of the same kind or to provide two equal signals with 90° phase shift to two identical antennas, for example two quarter-wave monopoles in a feed. The theoretical electrical characteristic of a quadrature 3 dB hybrid made from distributed elements as shown in Fig. 1 can be seen from Fig. 2. Coupling on the design frequency of 1.3 GHz is exactly 3 dB and isolation is infinite. Bandwidth for good isolation (> 20 dB) and coupling symmetrie (< 0.17 dB) is about 10 %. This is a broad-

**Figure/Abb. 1: Ideal 3dB/90° Branch Coupler**




**Figure/Abb. 2: Ideal 3dB/90° Branch Coupler (Simulation)**

band device. If properly constructed there should be no need for tuning.

## Einführung

Zur Zusammenschaltung von Verstärkern und zur Erzeugung zirkular polarisierter Felder mittels Linearantennen dienen 3 dB Quadraturkoppler. Das Prinzipschaltbild in Abb. 1 zeigt einen Ring von vier Viertelwellenleitungen mit einer Impedanz von 50 Ω und $^{50}/\sqrt{2} = 35{,}35\ \Omega$ (Abb. 1). Wenn das Tor 1 das Summentor ist, wird die Leistung am Summentor zu gleichen Teilen (-3 dB) auf die Tore 2 und 3 aufgeteilt. Tor 2 hat -90° und Tor 3 hat -180° Phasenverschiebung, so daß zwischen Tor 2 und 3 eine Phasendifferenz von -90° ist. Die Tore 1 und 4 sowie 2 und 3 sind jeweils voneinander isoliert.

Schließt man Tor 4 mit 50 Ω ab, wirkt der Hybrid wie ein Leistungsteiler. Das Verhalten im Fall von Fehlanpassungen an den Ausgängen 2 und 3 wird durch folgende Gleichungen beschrieben. Die Gleichung für die Rückflußdämpfung an Tor 1 ist:

$$[1]\quad RL_1 = 20\cdot\log\frac{|\rho_2 - \rho_3|}{2}$$

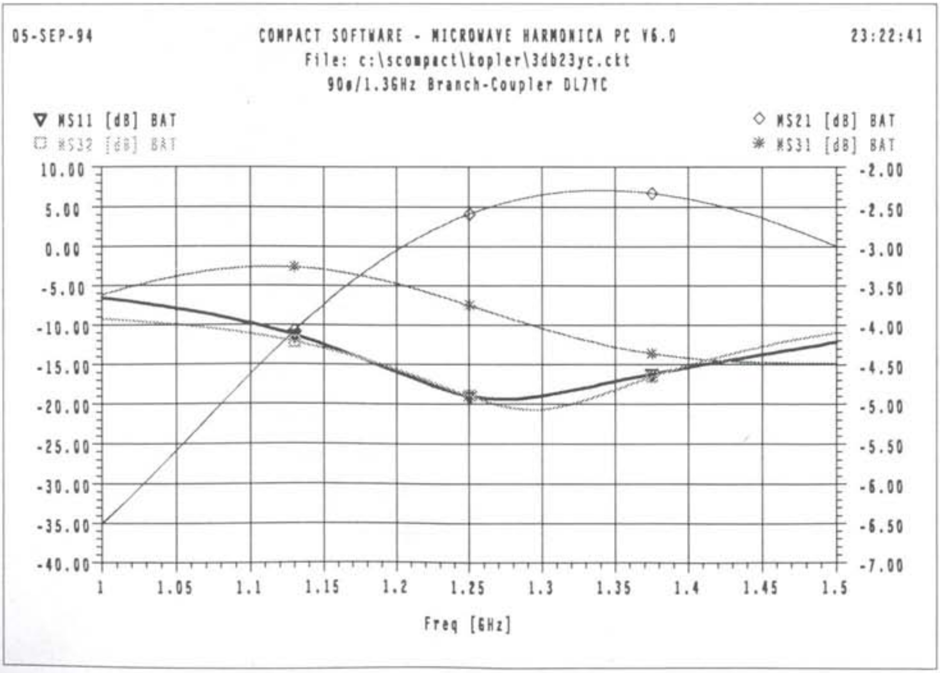
$$\text{mit } \rho = \frac{Z - Z_0}{Z + Z_0}$$

Ist $\rho_2 = \rho_3$, so ist die Rückflußdämpfung unendlich.

$$[2]\quad ISO_{1-4} = 6 + 20\cdot\log\frac{1}{|\rho_2 + \rho_3|}.$$

Bei Fehlanpassung an Tor 2 und 3 wird reflektierte Leistung von den Toren 2 und 3 in Tor 4 reflektiert und dort absorbiert. Falls die gleiche Lastimpedanz an den Toren 2 und 3 vorliegt, sind an Tor 1 alle reflektierten Spannungen 180° außer Phase, so daß sie sich auslöschen. Die Isolation zwischen Tor 1 und 4 ist allerdings vom Reflexionsfaktor an den Toren 2 und 3 abhängig.

Diese Eigenschaften des 90°/3 dB Hybrids sind zum Zusammenschalten von Verstärkern, die gleiche Eingangs- und Ausgangsimpedanzen haben, und zur Kopplung von linearen Antennen zwecks Erzeugung von zirkularer Polarisation bestens geeignet.




**Figure/Abb. 3: Original Coupler from DL7YC (Simulation)**

Die thoeretischen elektrischen Eigenschaften des in Abb. 1 gezeigten Hybrids sind aus Abb. 2 ersichtlich. Die Bandbreite für gute Symmetrie (< 0,17 dB) und Isolation (> 20 dB) ist ca. 10 %. Der Hybrid ist folglich ein Breitbandsystem. Falls er richtig bemessen ist, sollte ein Abgleich auf eine Frequenz völlig unnötig sein.

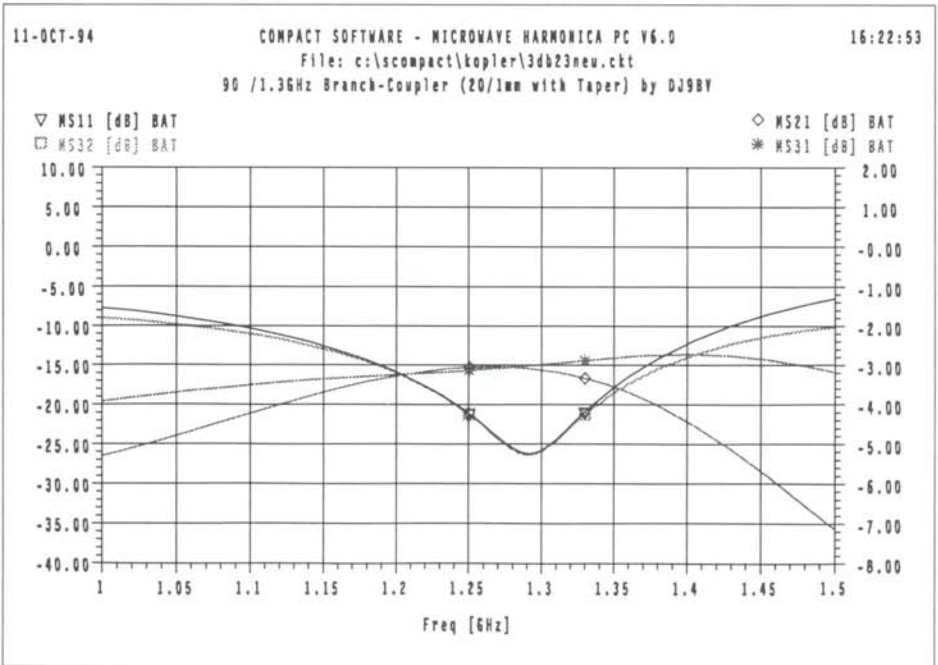
## Power Hybrids with Air Lines

Some amateurs tried to develop low loss airline branch couplers for 1.3GHz. Many EME amateurs use the hybrid described by Manfred Plötz, DL7YC in [1]. When Frank, DD1XF, decided to build a system for 23 cm EME, he constructed this type of hybrid to achieve circular polarisation with his feed. He measured a poor isolation of roughly 20dB and a very poor symmetry of 2.5 dB coupling at port 2 and 3.8 dB respectively at port 3. A quick inspection of this hybrid with COMPACT software MICROWAVE HARMONICA confirmed his findings and showed disappointing results (Fig. 3). Isolation is 20 dB at best and symmetry is 2.3/4 dB, a 1.7 dB difference between coupled ports. A look on OE9PMJs modification of DL7YCs hybrid, which uses a 0.8mm thick stripline with otherwise the same dimensions, exhibits nearly the same properties of poor isolation and poor symmetry. Likewise those versions, which use tuning screws to achieve reasonable properties seem to be rather odd: a broadband device should not be tuned.

Therefore it was decided to develop a new hybrid with at least 26 dB isolation and maximum ±0.3 dB unsymmetry. To require a higher isolation makes no sense, because the isolation between port 1 and port 4 is given by equation [2] for the case of mismatch at the two output ports 2 and 3. If we assume a return loss of 23 dB for each monopole in a feed - quite a good match for an antenna- we have $\rho_2 = \rho_3 = 0.07$. According to equation [2] this results in an isolation between port 1 and 4 of

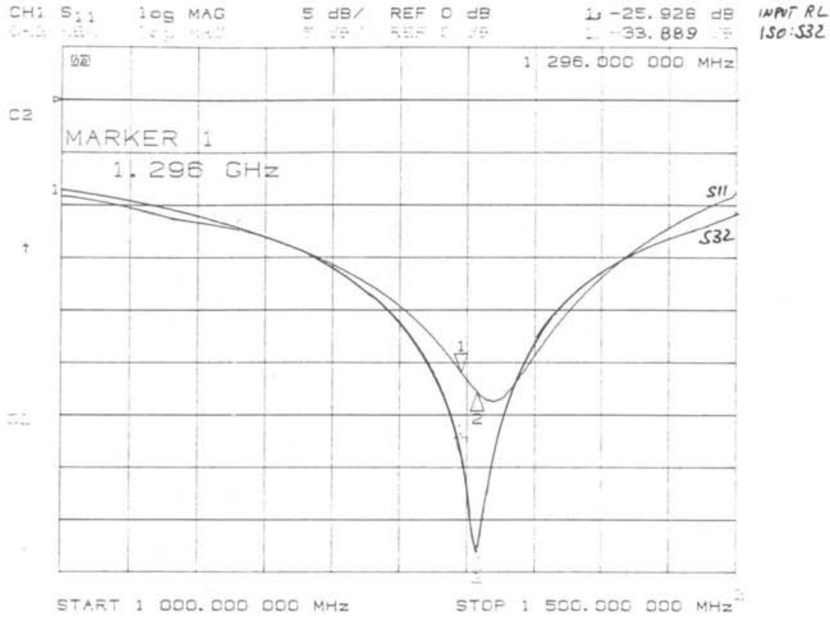
$$ISO_{1-4} = 6 + 20\cdot\log\frac{1}{|0.07 + 0.07|} = 6+17 = 23dB.$$

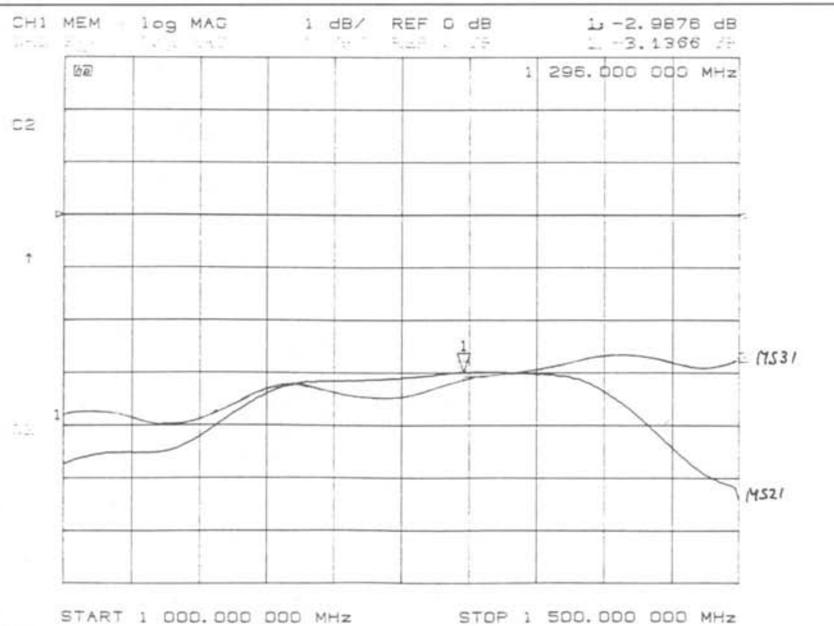
Basically with a perfect hybrid you can achieve only a maximum isolation equal to the return loss of the loads. When putting the feed into a dish the situation gets even worse. The image of the horn




**Figure/Abb. 4: Stripline 90°/3dB Coupler (Simulation)**

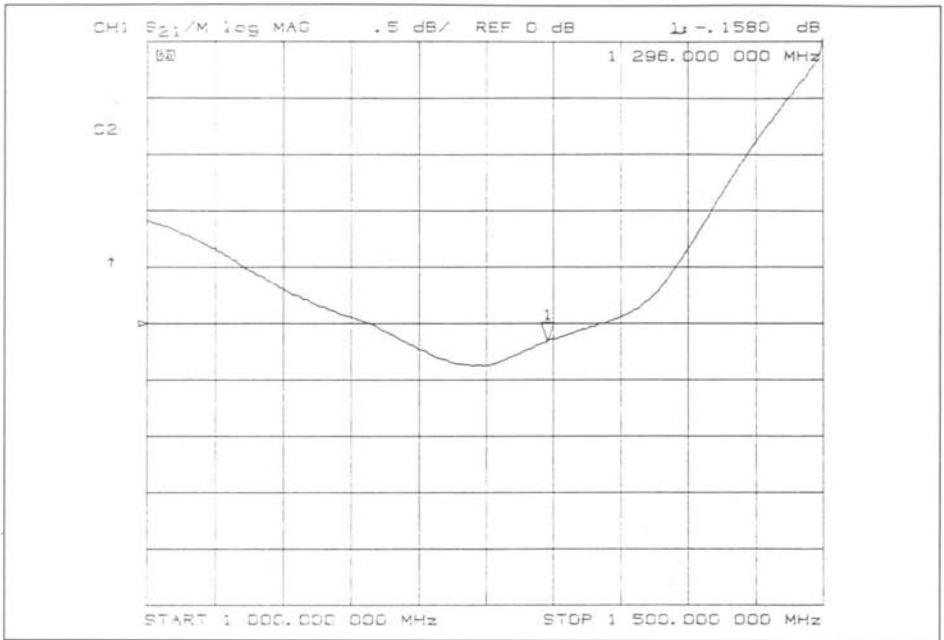
**Figure/Abb. 5: Measured Return Loss and Isolation**




**Figure/Abb. 6: Measured Coupling Factors**

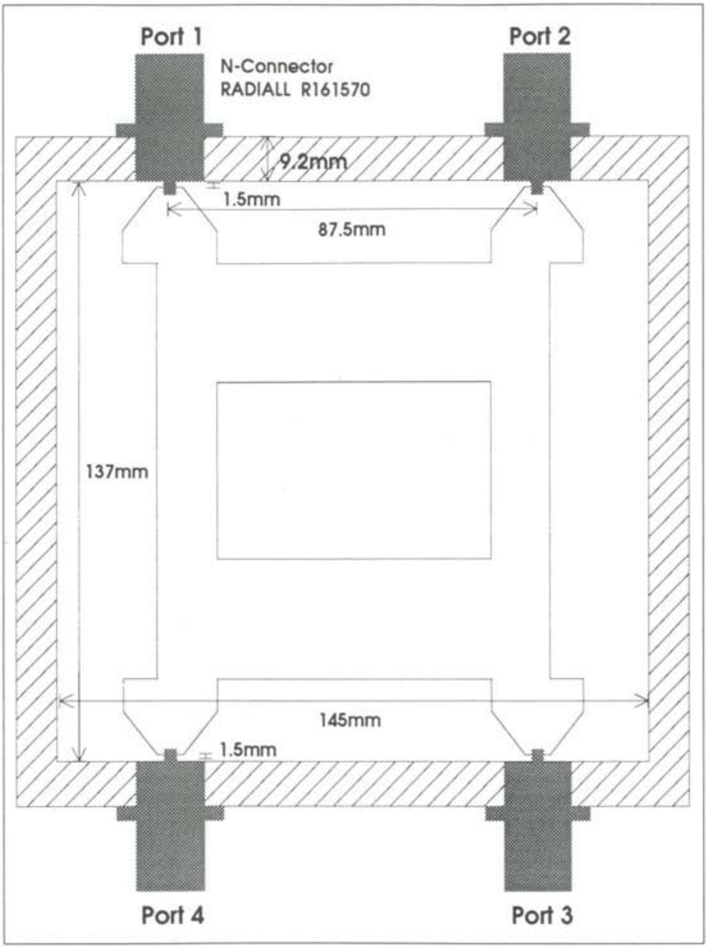
**Figure/Abb. 7: Measured Symmetry**





**Figure/Abb. 8: Measured Phase Difference**

**Figure/Abb. 9: Air Line Hybrid/Top View**




The required value of isolation is not an easy task to achieve. The main problem is to design a proper transition from the inner line of the N-connector to the hybrid. To get good symmetry, the junctions between the 50 Ω and 35 Ω lines have to be perfect. This cannot be done, because in a stripline circuit, the T-junctions have very undesirable effects.

Finally the design target was achieved by designing tapered transitions from coaxial to striplines and carefully controlled deviation from the ideal impedance values of 50Ω and 35Ω and the quarter-wave length of 58mm. This process has been done with the optimizer of MICROWAVE HARMONICA. The simulated performance looked good as in Fig. 4, indicating an isolation of 26 dB and a symmetry of ±0.1 dB. The practical results (after some prototypes the trick with the tapered junctions was invented!) are not bad: 33 dB isolation (Fig. 5) on 1296 MHz and a symmetry of ±0.08 dB (Figs. 6, 7). Phase difference is 89.4° (Fig. 8). Loss is less than 0.05 dB. Maximum power is only limited by the N-connectors and should be limited to 1kW.

on the center of the dish reflects back into the feed. The reflected power results in a phase dependent variation of the isolation. The phase depends on the position of the horn relative to the surface of the dish. By these reasons a 26 dB requirement is by far good enough. Concerning the requirement for symmetry it's worth to note that most W2IMU type of feeds achieve only a 'roundness' of ±0.5 dB at best. Therefore it makes no sense to have a perfect circular polarisation to receive those elliptical polarized signals from other stations. This leads to a requirement of ±0.3 dB for symmetry.

The small deviation from simulation is caused by the specific model of striplines, which are defined between infinite planes. An appropriate suspended stripline - striplines in a box - model for T-junctions was not available. The otherwise good agreement speaks for the quality of the computer models involved. Interesting is the behaviour of the coupling ratios of the two output ports. They have quite a broad range of intersection and are tilted in comparison to the freqency axis. This is typical for all type of stripline branch couplers.

## Leistungshybride mit Luftleitungen

Einige Amateure haben versucht, verlustarme Hybrids zum Zusammenschalten von Leistungsverstärkern und für zirkulare Polarisation auf 23cm zu entwickeln. Der Hybrid (siehe [1]) von Manfred Plötz, DL7YC, ist bei vielen EME-Amateuren in Gebrauch. Frank, DD1XF, baute einen solchen Hybrid, um seine 23 cm EME-Anlage zu errichten. Messungen ergaben enttäuschende Meßwerte: 20 dB für die Isolation und einen Symmetriefehler von 1,3 dB (2,5/3,8 dB). Eine Simulation mit MICROWAVE HARMONICA von COMPACT Software Inc. bestätigte die Messungen (Abb. 3). Auch die Abwandlung von OE9PMJ mit dünneren Streifenleitungen (0,8mm) hat fast die gleichen Eigenschaften. Andere Versionen benutzen Abstimmschrauben, um halbwegs befriedigende Werte zu erzielen. Das ist ziemlich merkwürdig, denn ein Breitband-Koppler muß ja gerade nicht abgestimmt werden, es sei denn, er ist falsch dimensioniert.

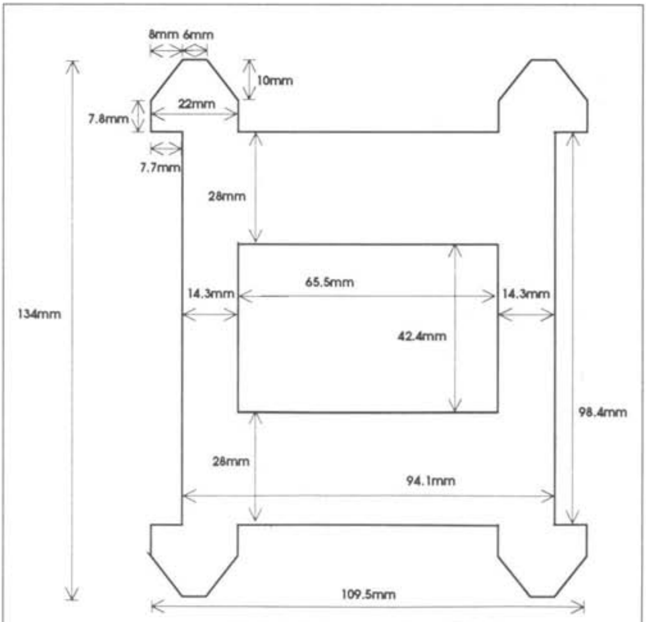
Daher war die Entwicklung eines brauchbaren Hybrids für 23 cm notwendig. Die Anforderungen wurden mit 26 dB als Minimalwert für die Isolation und ±0.3 dB für die Symmetrie festgelegt. Mehr Isolation zu fordern ist nicht sinnvoll, da nach Gleichung [2] die Isolation vom Last-VSWR abhängig ist. Hat man z.B. ein Horn, dessen Viertelwellen-Erreger auf 23 dB Rückflußdämpfung abgestimmt sind (VSWR=1,15), folgt aus Gleichung 2, daß die Isolation nur maximal 23 dB betragen kann:

$$ISO_{1-4} = 6 + 20\cdot\log\frac{1}{|0.07 + 0.07|} = 6+17 = 23dB$$

Das gilt für einen idealen Hybrid mit unendlicher Isolation. Im praktischen Fall wird also die Isolation immer auf die Rückflußdämpfung der Lasten an Tor 2 und 3 reduziert. Bringt man das Speisehorn nun in einen Spiegel, wird ein Teil der Leistung vom Zentrum des Spiegels reflektiert. Das kann je nach Phasenlage die Isolation weiter reduzieren.

Für die Symmetrie ist eine Anforderung von ±0.3 dB gut genug, wenn man bedenkt, daß die weit verbreitete Version des W2IMU-Horns eine Symmetrie von bestenfalls ±0.5 dB hat. Es macht wenig Sinn, elliptisch polarisierte Signale mit erstklassiger zirkularer Polarisation zu empfangen.

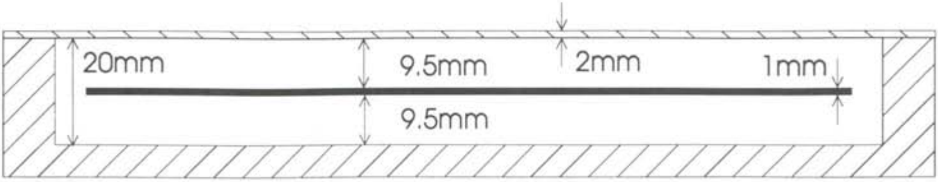
Um die geforderte Isolation zu erreichen, sind einige Anstrengungen erforderlich. Das Hauptproblem ist der Übergang von dem koaxialen N-Anschluß auf die Streifenleitungen. Jede Reflexion an dieser Stelle vermindert ja nach Gleichung [2] die Isolation. Daran kranken auch alle bisherigen




Material: Copper 1mm Thick

**Figure/Abb. 10: Stripline of Air Line Hybrid**

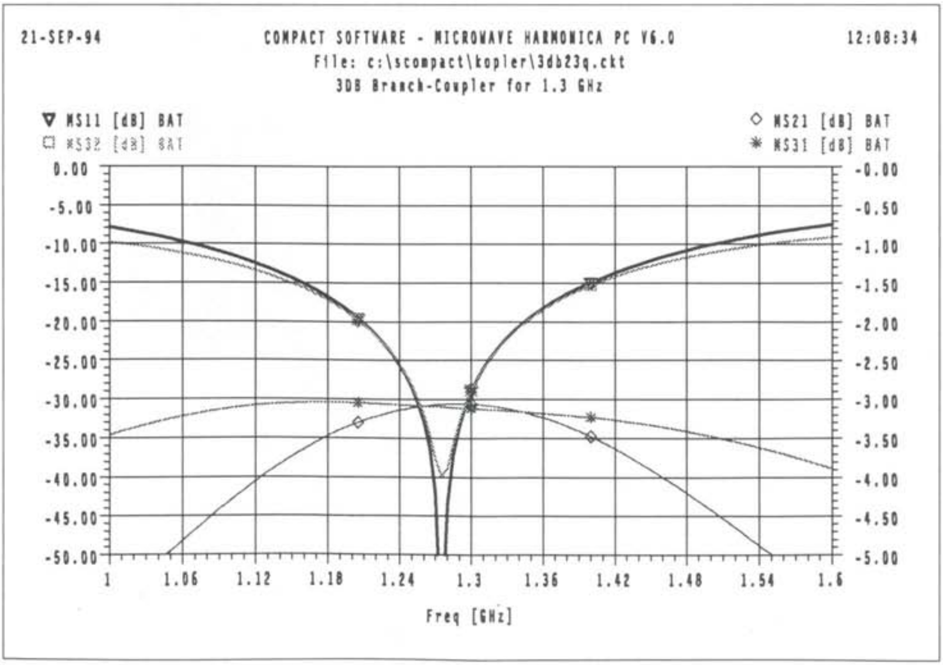
**Figure/Abb. 11: Air Line Hybrid/Side View**




Konstruktionen. Zweitens müssen für gute Symmetrie die Verbindungen an den Stoßstellen der Leitungen perfekt sein. Diese sind aber im Fall von Strreifenleitungs T-Verzweigungen, die sich ganz anders verhalten.

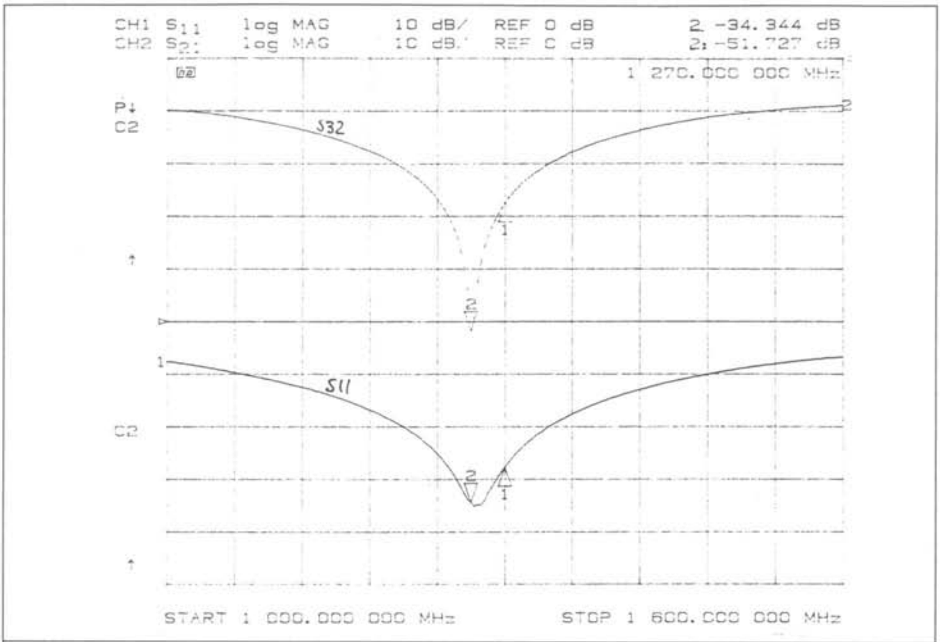
Das Problem wurde gelöst durch die Anwendung von 'Taper-Leitungen' zwischen Hybrid und N-Buchsen sowie eine geeignete Abweichung von den theorethischen Impedanzwerten der Leitungen. Dieses wurde mittels des Optimierers in MICROWAVE HARMONICA durchgeführt. Das Simulations-Ergebnis in Abb. 4 läßt sich sehen: 26 dB Isolation und ±0.15 dB Symmetrie. Die Impedanzen der Leitungen sind deutlich von 50 und 35,35 Ω verschieden. Auch die Längen weichen deutlich vom theoretischen Wert von 58 mm ab. Das praktische Resultat ist noch besser: 33 dB Isolation (Abb. 5) und ±0,08 dB Symmetrie (Abb. 6,7) auf 1296 MHz! Die Phasendifferenz ist 89,4° (Abb. 8). Die Dämpfung beträgt weniger als 0,05 dB. Die maximale Leistung ist nur durch die N-Buchsen begrenzt und sollte deswegen kleiner als 1 kW sein.

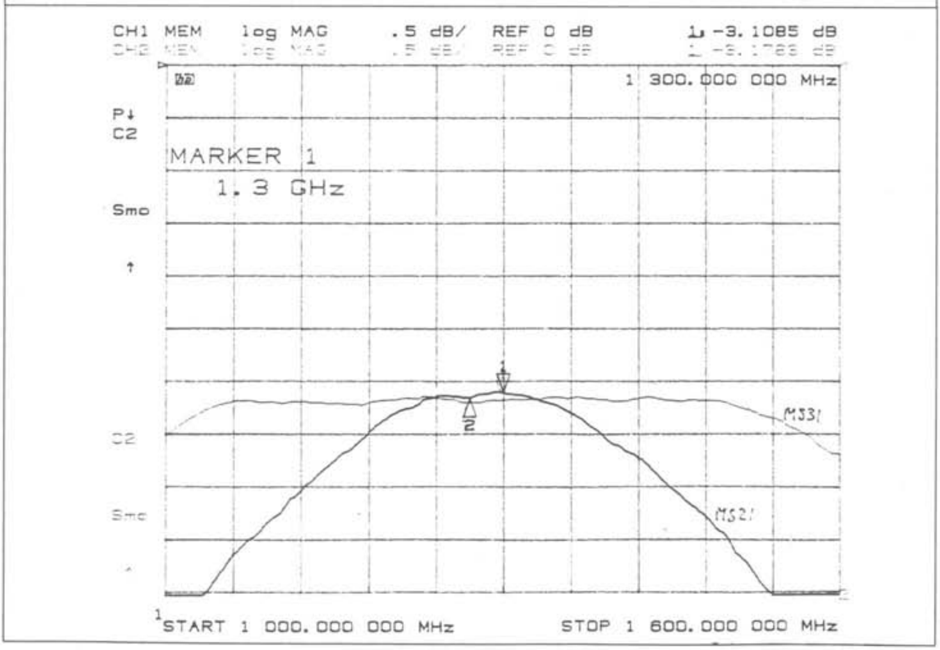
Die geringe Abweichung zwischen Simulation und Messung ist durch das verwendete Modell der Streifenleitung, das unendliche Flächen als Masseflächen voraussetzt, erklärt. Angemessen wäre ein 'Suspended Stripline' Modell, das Streifenlei-




**Figure/Abb. 12: Branch Coupler on TEFLON Board-Simulation**

**Figure/Abb. 13: Measured Return Loss and Isolation of PCB**




**Figure/Abb. 14: Measured Coupling of PCB-Version**

tungen in einem Kasten modelliert. Das ist leider nicht verfügbar. Der Frequenzgang der Kopplung (Abb. 6) weicht deutlich vom idealen Koppler (Abb. 2) ab. Das ist durch den Einfluß der T-Verweigungen bedingt.

## Construction

The construction is straightforward. The dimension can be seen from Figs. 9, 10 and 11. The stripline is cut from 1 mm thick copper (Fig. 10). Avoid sharp edges. Some surface polishing and subsequent silvering may be useful. The box can be constructed from 10 mm aluminium profiles or ultimatively machined from a solid block (Fig. 9). The stripline must be carefully centered and adjusted before soldering it to the 4 N-connectors (Fig. 11). The N-connectors must be of that type which has a thread long enough to fit exactly to the thickness of the walls of the box. This means the thread has to flush exactly at the inner wall of the box to avoid an undesirable impedance step. Otherwise the values for isolation and input return loss cannot be achieved. In contrary to a common belief the hybrid is quite insensitive to mechanical deformation. A change of 0.1 mm in thickness of the outer box has no visible effect on the parameters.

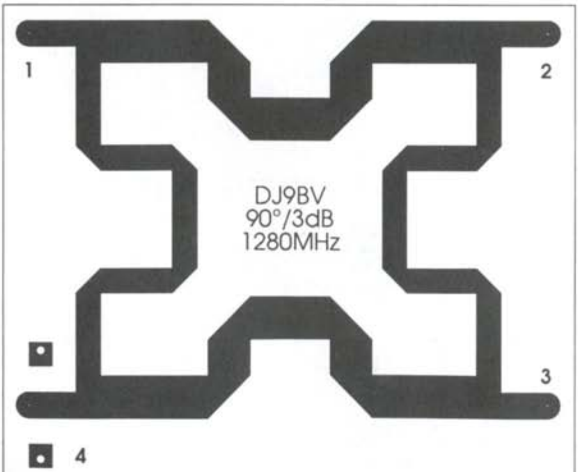
## Konstruktion

Die Abmessungen des Luftleitungskopplers kann man aus den Abb. 9, 10 und 11 ersehen. Die Stripline wird aus 1 mm Kupferblech ausgesägt (Abb. 10). Scharfe Kanten sind zu glätten. Es schadet nicht, die Stripline zu polieren und zu versilbern. Das Gehäuse kann entweder aus 10 mm Aluminiumprofilen zusammengefügt oder aus dem Vollen gefräst werden (Abb. 9). Nach dem Einschrauben der N-Buchsen, deren Ende bzw. deren PTFE-Isolation genau mit der Innenwand des Gehäuses fluchten muß, muß die Stripline genau mittig und symmetrisch ins Gehäuse eingelegt und mit den Innenleitern der N-Buchsen verlötet werden (Abb. 11). Mechanische Deformatione haben im Gegensatz zum allgemeinen Glauben keinen großen Effekt auf die Parameter. Eine Dickenänderung des Gehäuses von 0,1 mm kann man in den Meßwerten kaum erkennen. Der Hybrid ist eben ein Breitband-Vierpol.

## A Microstripline Hybrid

A 3 dB/90° branch coupler can be constructed in microstripline technique also. Fig. 15 shows the PCB on Taconix TLX, a glass PTFE material with $\varepsilon_r$=2.5 and 0.79 mm thickness. The two pads on the lower left port can be used to install two 100Ω SMD-resistors as a load for low power applications (< 1W).

Simulated performance can be seen in Fig. 12. Measured performance can be seen in figures 13 and 14. Isolation is 51.7 dB at best and symmetry is better than ±0.04 dB. Center frequency is 1275 MHz. The useful frequency range is from 1240 to 1300 MHz. This property renders it useful for combining amplifiers in the 23 cm ATV and SSB-bands. Loss is less than 0.1 dB. Maximum power should be limited to 80 W.

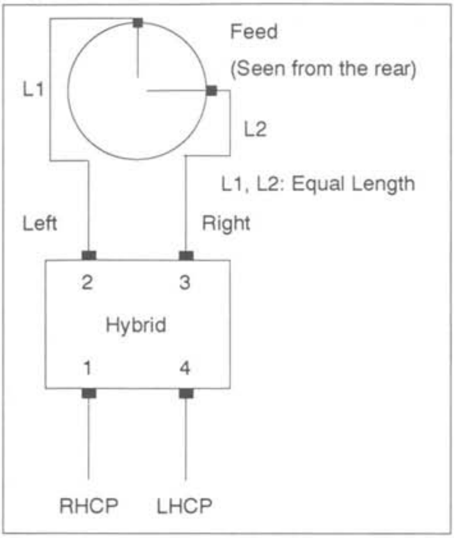



Figure/Abb. 15: PCB Branch Coupler

## Microstripline Hybrid

Man kann einen 3 dB Koppler auch in Microstripline Technik aufbauen. Abb. 15 zeigt die Platine eines Kopplers auf PTFE Taconix TLX ($\varepsilon_r$=2.5 und 0.79 mm Dicke). Die zwei Massefelder am Tor 4 können für zwei 100 Ω SMD-Widerstände verwendet werden. Diese dienen als 50 Ω Last für Kleinleistungsanwendungen (< 1 W).

**Figure/Abb. 16: Circular Polarisation**




Die Simulationsergebnisse sind in Abb. 12 zu erkennen. Die gemessenen Eigenschaften sind in Abb. 13 und 14 zu sehen. Die Isolation ist maximal 51,7 dB und die Symmetrie ist besser als ±0,04 dB. Der Frequenzbereich ist von 1240...1300 MHz. Mittenfrequenz ist 1275 MHz. Der Verlust ist weniger als 0,1 dB. Die maximale Leistung sollte auf 80 W begrenzt werden.

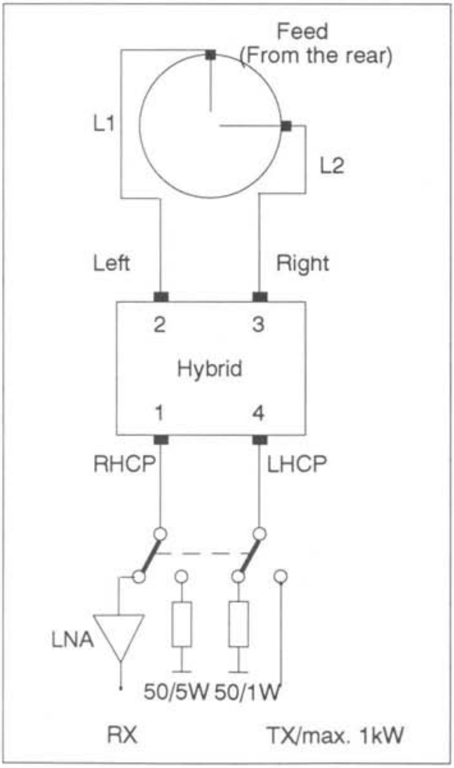
# Applications

## Circular Feeds

To achieve circular polarisation two perpendicular monopoles in a feed horn are fed by the two outputs of a 3 dB/90° hybrid (Fig. 16). Port 1 is the RHCP input and port 4 is the LHCP input. The unused port has to be loaded with a 50 Ω load. To preserve isolation the two monopoles must to be adjusted to a small VSWR as possible and it should be identical for both to avoid degeneration of the input VSWR.

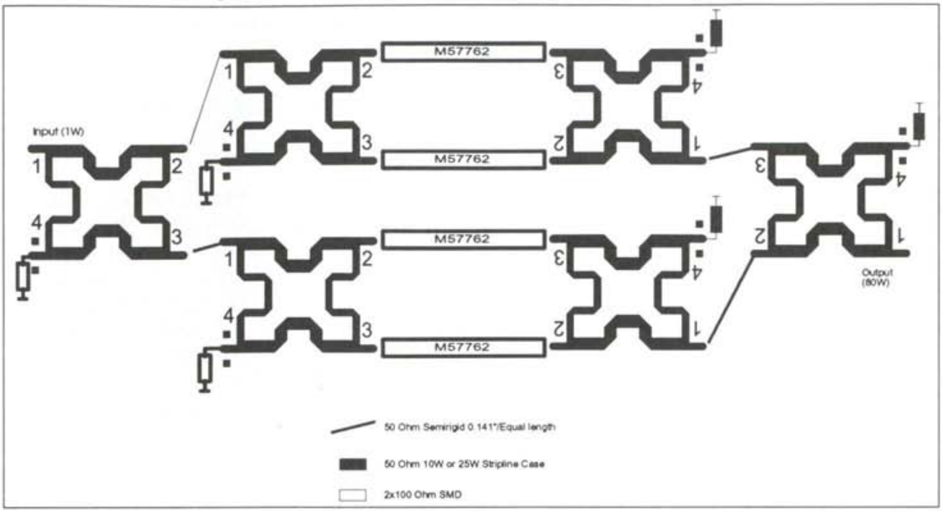
On 1.3GHz the transmit-polarisation is defined as RHCP for EME stations. The feed has to be operated with LHCP polarisation during transmit because the reflection on the dish reverses the polarisation. Therefore the TX-signal has to be fed into the LHCP port of the hybrid as shown in Fig. 17. By the same argument the RX-signal has to be taken from the RHCP port of the hybrid to achieve LHCP polarisation of the dish on receive. Coaxial relays switch to the appropriate port and load the unused port with 50Ω. The receive port dummy should have a rating of transmit power divided by 100 to allow for low isolation because of the horn image reflection in the dish. The transmit port dummy can have a low rating as 1 W.

To achieve maximum isolation when mounting the feed into the dish, the phase of the reflected wave should be adjusted. In fact the reflected waves from the loads of the hybrid and the reflected wave from the dish add at the RX-port dependent on their relative phase. First the best focus position of the feed has to be determined by optimizing the sun noise. Usually from this position a range of ±60 mm variance can be tolerated without affecting sun noise. The resulting ±90° phase variation




**Figure/Abb. 17: TX/RX Switch for 23cm EME**

**Figure/Abb. 18: Power Combining with Hybrids**




may eventually result in a null of total reflected power in the RX-port. The value of sun noise has to be checked after this isolation adjustment. In any case an optimum value of sun noise is more important than an optimum value of isolation.

### Power Combining

To combine four M57762 modules 3db hybrids can be used in the configuration of Fig. 18. Please note, that for preserving the correct relationship of signal phase the output hybrids either have to be connected in 'reverse' order (Fig. 18) or output has to taken from port 4 (Fig. 19). At the output the loads have to be power stripline loads of 10 and 25 W respectively. In case of failure of one branch the load has to to take half of the output power.

## Anwendungen

### Zirkulare Polarisation

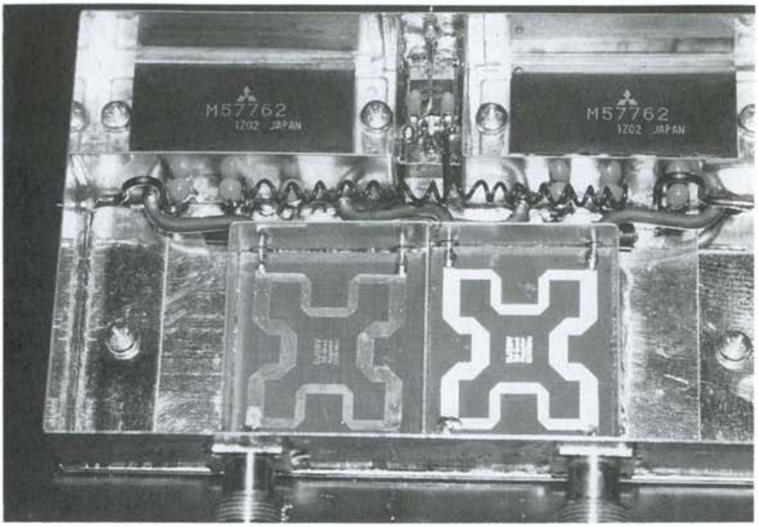
Um zirkulare Polarisation zu erzeugen, kann man zwei aufeinander senkrecht stehende Viertelwellenstrahler in einem Horn mit den zwei 90° phasenverschobenen Ausgängen eines 3dB Hybrids erregen (Abb. 16). Tor 1 ist der Eingang für rechtsdrehende Polarisation (RHCP) und Tor 4 der Eingang für linksdrehende Polarisation. Das jeweils unbeschaltete Tor muß mit 50 Ω abgeschlossen sein. Um die Isolation zwischen Tor 1 und 4 zu erhalten, müssen die Strahler auf möglichst niedriges und gleiches VSWR abgestimmt werden. Auf 1,3 GHz ist vereinbart, daß EME-Stationen im Sendefall rechtsdrehend polarisiert sind. Da der Spiegel wegen der Reflektion die Drehrichtung der Polarisation umdreht, muß das Sendesignal (TX) am LHCP Tor eingespeist werden (Abb. 17). Analog muß das Empfangssignal am RHCP Tor abgenommen werden, um linksdrehende Polarisation bei Empfang zu erreichen - die Mondoberfläche kehrt als Reflektor ebenfalls die Polarisationsrichtung um -. Koaxiale Relais schalten auf den jeweils unbenutzten Eingang eine 50 Ω Last. Für den Empfangsfall braucht die Belastbarkeit nur 1 W betragen. Für den Sendefall sollte man wegen der Hornreflektion im Spiegel ein Hundertstel der Sendeleistung als Belastbarkeit vorsehen.

Falls die tatsächliche Isolation durch eine ungünstige Phase des reflektierten Signals verringert wird, kann man die Fokusposition des Horns um ±60mm verändern, um eine Auslöschung des reflektierten Signals zu erreichen. Das entspricht einer Phasenvariation von ±90°. In jedem Fall ist maximales Sonnenrauschen wichtiger als maximale Isolation.

### Leistungsteiler/-summierer

Quadratur-Hybride dienen auch zur Zusammenschaltung von mehreren Leistungsverstärkern. Abb. 17 zeigt die Anwendung des TEFLON-Hy-

**Two Power Modules M57762 combined with 3dB Hybrids**




brids zur Zusammenschaltung von vier Leistungsmodulen M57762. Um die korrekte Phase für die Signale zu erhalten, müssen die Ausgangshybride entweder seitenverkehrt (Abb. 18) oder wie in Abb. 19 angeschlossen werden. Die Hybride am Ausgang werden mit 10 W bzw. 25 W Stripline-Lastwiderständen abgeschlossen. Diese Belastbarkeit ist notwendig, weil beim Ausfall eines Zweiges diese Last die Hälfte der Leistung übernehmen muß.

## Literatur/References

[1] Manfred Plötz, DL7YC, "Ein High-Power Qudarturkoppler für 1296MHz", in UHF-Unterlage III, Ed. K. Weiner, Hof, 1980, S. 437-439

## Parts/Teile

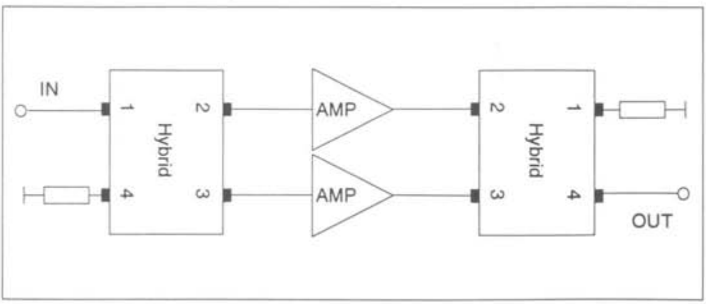
Special N-connectors, stripline loads and PCBs are available from Rainer Jäger, DC3XY, Breslauer Str.4, D-25479 Ellerau (Tel.: (++49)4106-73430.

Spezial N-Buchsen, Lastwiderstände und Platinen sind von Rainer Jäger, DC3XY, Breslauer Str.4, D-25479 Ellerau (Tel.: (++49)4106-73430 erhältlich.

## Danksagung/Acknowledge

Ich danke Frank Schreyer, **DD1XF**, für die unermüdliche Anfertigung von Prototypen und Axel Bünning, **DF1XB**, für die Erstellung der Layouts für die Teflon-Version.

I have to thank Frank Schreyer, **DD1XF**, for the time consuming work to produce all the prototypes. Axel Bünning, **DF1XB**, made the layouts for the PCB-version of the hybrid.



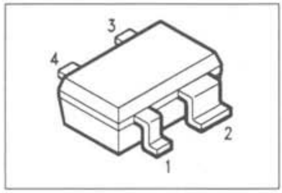

**Figure/Abb. 19: Alternative Connection of Hybrids**

# Microwave Parts

Editor: Rainer Bertelsmeier

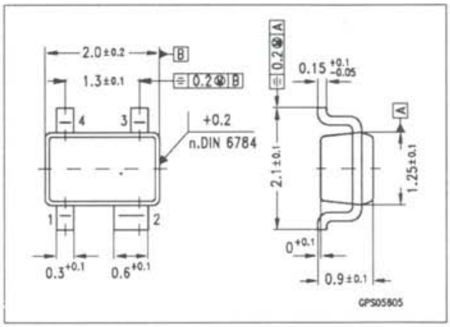
## New SIEGET Line of Silicon RF-Transistors by Siemens

### NPN Silicon RF Transistor BFP420




Preliminary Data

- For High Gain Low Noise Amplifiers
- For Oscillators up to 9 GHz
- Noise Figure F = 1.05 dB at 1.8 GHz
- Outstanding $G_{MS}$ = 20 dB at 1.8 GHz
- Transition Frequency $f_T$ > 20 GHz
- Gold metalization for high reliability
- SIEGET-Line
  Siemens Grounded Emitter Transistor-Line




| Type | Marking | Ordering Code (8-mm taped) | Pin Configuration 1 | 2 | 3 | 4 | Package |
|---|---|---|---|---|---|---|---|
| BFP420 | AMs | Q62702-F1591 | B | E | C | E | SOT343 |

**Maximum Ratings**

| Parameter | | Symbol | Value | Unit |
|---|---|---|---|---|
| Collector-emitter voltage | | $V_{CE0}$ | 4.5 | V |
| Collector-base voltage | | $V_{C0}$ | 15 | V |
| Emitter-base voltage | | $V_{EB0}$ | 1.5 | V |
| Collector current | | $I_C$ | 35 | mA |
| Base current | | $I_B$ | 3 | mA |
| Total power dissipation, | $T_s \leq 107°C$ 1,2) | $P_{tot}$ | 160 | mW |
| Junction temperature | | $T_j$ | 150 | °C |
| Ambient temperature range | | $T_A$ | -65...+150°C | °C |
| Storage temperature range | | $T_{stg}$ - | 65...+150°C | °C |
| **Thermal Resistance** | | | | |
| Junction-soldering point | 2) | $R_{thJS}$ | 270 | K/W |

1) TS is measured on the emitter lead at the soldering point to the pcb.

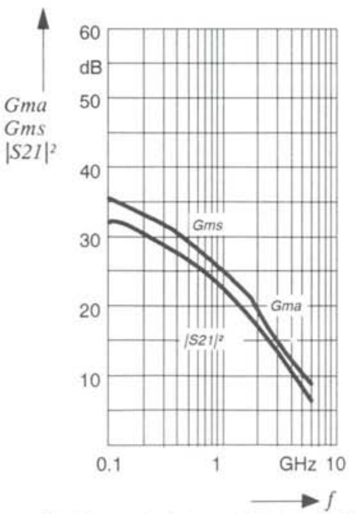
2) Ptot due to Maximum Ratings.

## AC Characteristics

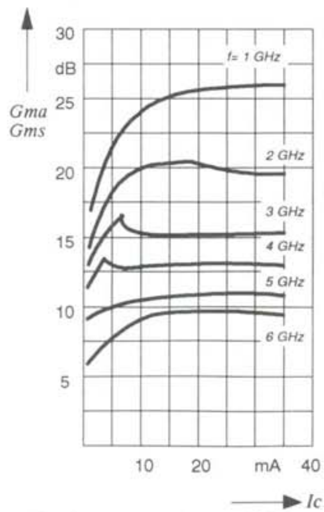
| Parameter | Symbol | Min | Typ | Max | Unit |
|---|---|---|---|---|---|
| Transition frequency<br>IC = 30 mA, VCE = 3 V, f = 2 GHz | $f_T$ | 20 | 22 | - | GHz |
| Collector-base capacitance<br>VCB = 2 V, VBE = vbe = 0, f = 1 MHz | Ccb | - | 0.15 | 0.3 | pF |
| Collector-emitter capacitance<br>VCE = 2 V, VBE = vbe = 0, f = 1 MHz | Cce | - | 0.41 | - | pF |
| Emitter-base capacitance<br>VEB = 0.5 V, VCB = vcb = 0, f = 1 MHz | Ceb | - | 0.55 | - | pF |
| Noise figure<br>$I_C$=5 mA, $V_{CE}$=2 V, f=1.8 GHz, $Z_S$=$Z_{Sopt}$ | F | - | 1.05 | 1.7 | dB |
| Power gain<br>$I_C$=20 mA, $V_{CE}$=2 V, f=1.8 GHz,<br>$Z_S$=$Z_{Sopt}$ , $Z_L$=$Z_{Lopt}$ | $G_{ms}$ (1) | - | 20 | - | dB |
| Insertion power gain<br>$I_C$=20 mA, $V_{CE}$=2 V, f=1.8 GHz, $Z_S$=$Z_L$=50Ω | $\|S_{21}\|^2$ | 14 | 17 | - | dB |
| Third order intercept point at output<br>$I_C$=20 mA, $V_{CE}$=2 V, f=1.8 GHz,<br>$Z_S$=$Z_{Sopt}$ , $Z_L$=$Z_{Lopt}$ | $IP_3$ | - | 22 | - | dBm |
| 1dB Compression point<br>IC = 20 mA, VCE = 2 V, f = 1.8 GHz,<br>$Z_S$=$Z_{Sopt}$ , $Z_L$=$Z_{Lopt}$ | $P_{-1dB}$ - | 12 | - | | dBm |

**Common Emitter Noise Parameters** ($V_{CE}$=2 V, $I_C$=5 mA)

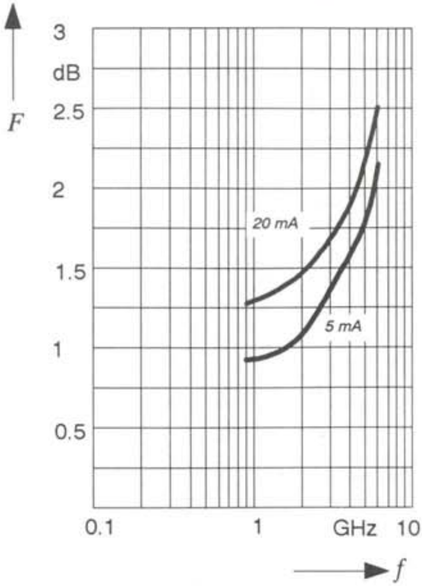
| f | $F_{min}$ | $G_a$ | $\Gamma_{opt}$ | | RN | rn | $F_{50\Omega}$ | Insertion PG |
|---|---|---|---|---|---|---|---|---|
| GHz | dB | dB | MAG | ANG | Ω | - | dB | dB |
| 0.9 | 0.90 | 20.5 | 0.28 | 20.0 | 8.7 | 0.17 | 1.02 | 20.3 |
| 1.8 | 1.05 | 15.2 | 0.20 | 82.0 | 6.7 | 0.13 | 1.11 | 15.8 |
| 2.4 | 1.25 | 13.0 | 0.20 | 124.0 | 5.5 | 0.11 | 1.32 | 13.5 |
| 3.0 | 1.38 | 12.1 | 0.22 | -175.0 | 5.0 | 0.10 | 1.48 | 11.6 |
| 4.0 | 1.55 | 10.3 | 0.33 | -157.0 | 5.5 | 0.11 | 1.83 | 9.1 |
| 6.0 | 2.20 | 6.4 | 0.53 | -123.0 | 15.0 | 0.30 | 3.30 | 5.3 |



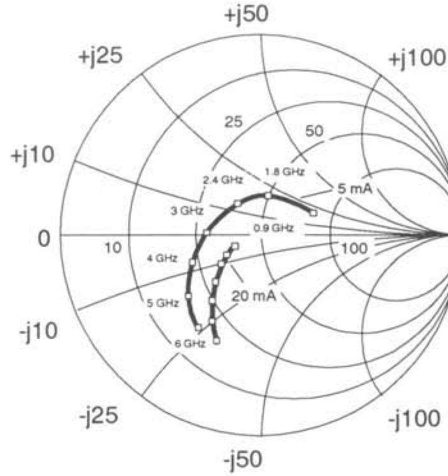

**Power Gain vs f (Vce=2 V, Ic=20**



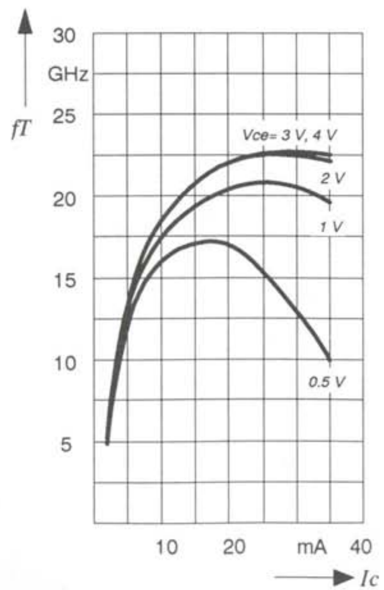

**Power Gain vs Ic (Vce=2 V)**




**Noise Figure vs f (Zs=Zsopt)**




**Source Impedance for min. NF**




**Ft vs Ic**

## NPN Silicon RF Transistor BFP405

Preliminary Data

- For Low Current Applications
- For Oscillators up to 12 GHz
- Noise Figure F = 1.15 dB at 1.8 GHz
- Outstanding $G_{MS}$ = 22 dB at 1.8 GHz
- Transition Frequency $f_T$ > 20 GHz
- Gold metalization for high reliability
- SIEGET-Line
  Siemens Grounded Emitter Transistor-Line

## NPN Silicon RF Transistor BFP450

Preliminary Data

- For Medium Power Amplifiers
- Compression Point $P_{-1dB}$ = 19 dBm at 1.8 GHz
- Max. Available Gain $G_{MA}$ = 14 dB at 1.8 GHz
- Transition Frequency $f_T$ > 20 GHz
- Gold metalization for high reliability
- SIEGET-Line
  Siemens Grounded Emitter Transistor-Line

# Microwave Europe

**Editor: John Sørensen, OZ1IPU**

## 1296 MHz

***DB6NT/A JO50TI wkd:*** 11.10.94 HB9RDE JN37, HB9RG JN47, SO1NVC/p JO83, OK1AIY/p JO70, 12.10.94 SP3EP JO81, SP3IAS JO81, SP5RDN KO02, OZ6OL JO65, 13.10.94 SM6GXV JO58, OZ1IPU JO57, OZ2OE JO45, OZ5DE JO65, LA6LCA JO59, OZ7IS JO65, SM7ECM JO65, 14.10.94 SM6FHZ, 16.10.94 9A2SB JN95, SP6GWB/p JO80, OE3EFS/3 JN78. Tks for info Michael.

***DC8UG JO30 wkd:*** 12-13.10.94 G4XUM, G6DER, G4PMK, G4BYV, G6SVJ, G8ECI, G3AUS, G0JDL, G4IDR, G8GXP. Tks for info Harald.

***DF0DA/p JO30JF wkd:*** 02.07.94 F5GYA/p JO15, 03.07.94 G8VOI/p IN90, G4WGE/P IO93. Tks for info

***DG1VL JO61WC wkd:*** 11.10.94 DC7BJ/p JO62, OE3EFS/3 JN78, SO1NVC/p JO83, DL6NAQ JO40, DG7NBE/p JO40, DC9BU/p JO40, DL8BDU JO43, DK1KQ JO43, DL0LH JO43. TRX: IC202 + LT23S, TX: 7.5W, Ant: 55ele F9FT. Tks for info Henry.

***DJ1LP JO64CC wkd:*** 19.07.94 OZ8TU JO65, SK6YH JO57, SM7KOJ JO66, 24.07.94 SM7DEZ JO65, SM7ECM JO65, 29.07.94 ES5WE/0 KO07, 31.07.94 DG0CAL JO52, 16.08.94 SO1NVC/p JO73, DL5KVA/p JO54, OZ1DOQ JO65, OZ7IS JO65, OZ8TU JO65, SK7BT JO65, SM7ECM JO65, 20.09.94 DG0KK/p JO63, OZ6OL JO65, 01.10.94 DL7AKL JO62, DK1KR JO53, DL1SUN/p JO53, DL5KVD JO65, OZ6OL JO65, 02.10.94 DF0YY JO62, 14.10.94 SP3JBI JO91, SP2DDV JO93, SO3EP JO81, OZ6AQ JO44, SP7IWM JO91, DL7AKL JO62, SP7DCS/7 JO91, DL1NTC JO63, G4PMK IO93, G4IDR IO93, G3APY IO93, G6DER IO93, DB1BX JO32, DG1ROD/p JO62, OK1DFC/p JO60, DG6MOG JO52, 18.10.94 SK6YH JO57, OZ6OL JO65, OZ1DOQ JO65, OZ8TU JO65. Tks for info Detlev.

***DJ8ES JN49 wkd:*** 08.01.94 DG5NEX JN49, 16.05.94 G8GXP IO93, G4PMK IO93, 28.06.94 SO1NVC/p JO73, 12.10.94 OS4GG JO20, PA3BAS JO21, DK5WO JO30, 13.10.94 DL6NAQ/p JO40, DG7NBE/p JO40, DC9BU/a JO40, OZ5DE JO56, SK7QJ JO76, OZ6OL JO65, DK1PZ JO51, DC9KK JO30, DK1YO JO31, PA3DYW JO22, DJ0HO JO50, G6DER IO93, G4XUM IO83, G3TQF IO92, G4MUT IO91, PA0HEJ JO22, PE1MVJ JO21, PA0TLX JO22, G8NAY IO81, OZ3KM JO55, OK1DFC/p JO60, 14.10.94 SO3EP JO81, SP3JBI JO91, DF0BT JO62, SP3DRT JO91, SP7CNL JO91, SP7JSG KO01, DL7UDA JO62, SP3IAS JO81, DL7VLD JO62, DB3KQ JO62, SP3JBI JO91. Tks for info Wolfgang.

***DL8BDU JO43AA wkd:*** 06.05.94 DB6NT/a JO50, 07.05.94 G4PUB/p JO01, DG5NEX JN49, DF6NA JN49, DL6NAQ /p JO40, DL5GBG/p JN48, ON7WR/a JO20, ON6ZT/p JO10, OK1DFC/p JO60, DL2JDX JO60, DL3IAS JN49, 08.05.94 DF0YY JO62, DL6NVC/p JO73, 04.06.94 DL3IAS JN49, DF6NA JN49, DK2GR JN59, DG9NBT JN49, 05.06.94 DB5ML JN58, OK1DFC/p JO60, 12.06.94 G6JHR JO01, 13.06.94 OZ1IPU JO57, 02.07.94 G4MRS/p JO02, G4JOR/p JO01, GM6MGS/p IO86, G4JAR/p JO01, DL6NVC/p JO73, OZ9EDR/p JO64, OZ2OE JO45, SM7SCJ JO65, SM7ECM JO65, ON4CP/a JO20, 03.07.94 DL0DR JN48, G3ULT/p IO91, DG0LAU/p JO61, OK5VHF/p JO70, SM6FHZ JO57, DJ1LP JO64, G0FDZ/p JO01, ON7WR/a JO20, DL0FH JO40, G3CKR/p IO93, DK2DB JN48, 08.07.94 LA6LCA JO59, 23.07.94 F5APQ JO00, G8VR JO01, F5LJA/p JO10, OZ2TG JO65, 24.07.94 SM6FHZ JO57, G1HWY IO90, SM6HYG JO58, 30.07.94 SM7UHF JO65, 21.08.94 DK2GR JN59. TRX: TS700G - DD9DU Transv. TX: 75W, Ant: 2m dish, 24 AGL. Tks for info Klaus.

***G4PMK IO93 wkd:*** 11.10.94 DJ3FI JO31, PA0WFO JO21, PE1NHS JO32, PA3GCO JO21, DC6NY JN59, PA0EZ JO22, DJ6JJ JO31, 12.10.94 DK1VC JO31, DK0UB JO31, PE1MVQ JO21, PA3BAS JO21, DK7LZ , DC8UG JO30, PE1JBK JO22, 13.10.94 PA0BAT JO31, DB1DI/p JO31, PE1JBK JO22, 14.10.94 DJ1LP JO64 DL5KVA JO64, DF3XZ JO53. Tks for info Roger.

***OZ2OE JO45VV wkd:*** 13.10.94 G4ICD IN89, ON4YZ JO20, DB6NT/a JO50, DL6NCI JO50, OS4GG JO20, OS4ANT JO20, DL6NAQ/p JO40, G3ZQU JO02, G4UDE IO82, 14.10.94 SP7DCS/7 JO91, OK1GFC/p JO60, SO3EP JO81, SP3IAS JO81, SP2DDV JO93. TX:18W, Ant: 35 ele loopyagi, RX: MGF1302. Tks for info Ole.

***PA0BAT JO31 wkd:*** 24.07.94 SM6HYG jo58, 30.09.94 OK1FFD/p JO60,12.10.94 G4XUM IO83, 13.10.94 GU8IRF IN89, F1SAH IN88, GD4GNH

IO74, SM6FHZ JO57, OZ1QZ JO45, SM7UHF JO65, SM6EAN JO57, DL6NVC/p JO73, OZ6OL JO65. Tks for info Gerard.

***TK/HB9MMM/p JN42MM wkd:*** 03.07.94 I2SG/2 JN45, IK2OFO JN45, EA3CSX JN11, 04.07.94 F6HTJ JN12, 09.07.94 IK3COJ JN65, I2SO JN45, and in JN42RU wkd: 15.07.94 IK2MMB JN45, 16.07.94 I2ROM JN45, IW0DB0/0 JN61, IW0CZC/6 JN62. TX:100W, Ant: 26 ele. Tks for info Peter.

## 2320 MHz

***DB6NT/A JO50TI wkd:*** 11.10.94 SO1NVP/p JO83, 12.10.94 SO3EP JO81, 13.10.94 OZ2OE JO45, LA6LCA JO59, OZ7IS JO65, SM7ECM JO65, 16.10.94 OE3EFS/3 JN78. Tks for info Michael.

***DC8UG JO30 wkd:*** 12.10.94 G4BYV JO02, 13.10.94 G6DER IO93 (724KM), 13.10.94 G3AUS IO80 (808 KM) Tks for info Harald.

***DJ8ES JN49 wkd:*** 13.10.94 DL6NAQ/p JO40, DG7NBE/p JO40, DC9BU/a JO40. Tks for info Wolfgang.

***G4PMK IO93 wkd:*** 12.10.94 DK1VC JO31. Tks for info Roger.

***OZ2OE JO45VV wkd:*** 13.10.94 PA3FPS JO22, PA3CNX JO22, DB6NT/a JO50, DL6NCI JO50, DL3YEE JO42, PA3DIJ JO33, DL6NAQ/p JO40, 14.10.94 SO3EP JO81 (First SP - OZ !!). TRX: DB6NT transv. TX: 1W, Ant: 35 ele loopyagi. RX:BC547 Hi Hi. Tks for info Ole.

***PA0BAT JO31 wkd:*** 24.07.94 SM6HYG JO58, 01.10.94 G4VIX/p JO01, 11.10.94 G6SPS JO01, 12.10.94 G6DER IO93, G8ECI JO03. Tks for info Gerard.

***TK/HB9MMM/p JN42MM wkd:*** 03.07.94 F/IW1PZC/p JN34, 08.07.94 IK2NHL JN45, 09.07.94 IK3COJ JN65, 11.07.94 F8IC JN33, and in JN42RU wkd: 16.07.94 I5WBE/5 JN53, 17.07.94 IW5AVM JN52. TX: 4W, Ant: 90cm dish. Tks for info Peter

## 3456 MHz

***DB6NT/A JO50TI wkd:*** 12.10.94 DD7MH JN68. Tks for info Michael.

***DC8UG JO30 wkd:*** 12.10.94 G4BYV JO02, 13.10.94 G4PMK IO93. Tks for info Harald.

***G4PMK IO93 wkd:*** 13.10.94 PA0BAT JO31, DJ6JJ JO31, DC8UG JO30, PE0PJV JO21, DL4EAU/p JO51 (845 KM), DC0DA JO31, PE1JBK JO22. TX:0.8 W, Ant: 60cm dish. Tks for info Roger.

***PA0BAT JO31 wkd:*** 03.07.94 PA6C JO33, 01.10.94 DL1BKK JO43, DF0SSB/p JO40, DL6NAQ/p JO40, 13.10.94 G4PMK IO93 (568 KM), G6DER IO93. Tks for info Gerard

## 5760 MHz

***DB6NT/A JO50TI wkd:*** 12.10.94 DD7MH JN68, 13.10.94 LA6LCA JO59 (990 KM), OZ7IS JO65, SM7ECM JO65. Tks for info Michael.

***DC8UG JO30 wkd:*** 12.10.94 G4BYV JO02, 13.10.94 G4PMK IO93 (736 km). Tks for info Harald.

***F/DJ7FJ/P JN37NV wkd:*** 03.07.94 HB9AMH/p JN37, HB9GBT/p JN37, PA3FPQ JO21, HB9MIO JN37. TX:4W, Ant: planar pad array, 25 x 15 cm. Tks for info Joe.

***G4PMK IO93 wkd:*** 13.10.94 PA0BAT JO31, DJ6JJ JO31, DC8UG JO30, DC0DA JO31, SM7ECM JO65 (958 KM), PE1JBK JO22. TX: 180 mW, Ant: 60 cm dish. Tks for info Roger.

***I0LVA JN62KA wkd:*** 15.07.94 TK/HB9MMM JN42, and in JN62CH 10.08.94 IK2MMB JN45, I3NGL/3 JN66, 11.08.94 I3EME/IT9 JM68, and in JN62KA 14.08.94 I3EME/IT9 JM68, and in JN62AX 15.08.94 I3EME/IT9 JM68, and in JN62CH 16.08.94 I2SG JN45, 17.08.94 I3EME/IT9 JM68, 23.08.94 I3EME/IT9 JM67, I6CXB/6 JN63. Tks for info Ricci.

***I0HP + I0LVA and IK0HWJ wkd:*** 19.06.94 S51WI/p JN75, I3ZVN/3 JN55, HB9SV JN45, IK3COJ JN65. TX: 1W, RX: NF 1.5 db, Ant: 1m dish. Tks for info Ricci.

**I0LVA on Monte Nerone**

*PA0BAT JO31 wkd:* 22.08.94 HB9AMH/p HB9MIN/p JN37, 01.10.94 DL1BKK JO43, G4VIX/p JO01, DF0CI JO51, 13.10.94 G4PMK IO93, G6DER IO93, SM6EAN JO57 (723 KM). Tks for info Gerard

*TK/HB9MMM/p JN42MM wkd:* 03.07.94 3A/IW2CEG JN33, IK2FIW/5 JN53, and in JN42RU wkd: 15.07.94 I0LVA JN62. TX:1W, Ant: 90cm dish. Tks for info Peter.

## 10368 MHz

*DB6NT/A JO50TI wkd:* 11.10.94 HB9RG JN47, HB9AMH/p JO37, DL2NUD JO63, 13.10.94 OZ2OE JO45, DL5KVD JO64, LA6LCA JO59 (990 KM), SM7ECM JO65, OZ1IPU JO57. Tks for info Michael.

*DC8UG JO30 wkd:* 12.10.94 HB9AMH/p JN37, G4BYV JO02, G4CBW IO83, G4FCD IO91, 13.10.94 G3LQR JO02, G8APZ JO01, G3DWG IO92, G4BCH/p IO90, G4BRK IO91. Ant: 1m dish, TX: 14W TWT, RX: NE32484. Tks for info Harald.

*DG1VL/p JO61XE + WA wkd:* 22.08.94 DL1VFL/p JO71, 14.10.94 DL5KVD JO64, DL5KVA JO64, DK1KR JO53 (ODX 391 KM) 25.10.94 DL1VFL/p JO70, and in JO71AE wkd: 22.08.94 DB6NT/a JO50, DK0NA, DC7JF/p JO50. TRX: IC202 + DB6NT Transv. TX: 0.2W, Ant: 60cm dish. Tks for info Henry.

*DJ8ES JN49 wkd:* 25.06.94 DL1BKK JO43, DL5KVA/p JO54, DL5KVD/a JO64. All worked on rainscatter (the first he ever made in this mode, see later). Tks for info Wolfgang.

*F/DJ7FJ/P JN37NV wkd:* 03.07.94 DJ3SX JN49 DJ5BV JO30, HB0/DG1GLH/p JN47 first HB0 - F 10GHz, PA3FPQ JO21, PA0EZ JO22, OE5VRL/5 JN78, PE0MAR/p JO21, DL3NQ JN49, DH9FAH JO40, DJ8ES JN49, DJ9VS JN49. TX: 5W, Ant: 90cm dish. Tks for info Joe.

*F5HRY BI22C wkd:* 03.07.94 F6HRE/p in33 (686 KM), HB9MIN/p JN37, 07.07.94 G4FUF JO01. TX: 450mW, Ant: 60cm dish. Tks for info Hervé.

*G4LDR IO91EC wkd:* 12.10.94 PA0EZ JO22, 13.10.94 PA0EZ, SM6ESG JO67 (1118 KM), PA0WWM JO22, F6DKW JN18, DF9LN JO31, 15.10.94 DF9LN. Ant: 0.6m dish 13m AGL (163m ASL), TX: 8W, NF: 1.5 db, TRX: G3WGD transv. Tks for info Neil.

*G4PMK IO93 wkd:* 13.10.94 PA0BAT JO31, DB1DI/p JO31, DL5KVD JO64, SM7ECM JO65 (958 KM), SM6ESG JO67, 14.10.94 G4FCD IO91. WB5LUA preamp, TX: 8W TWT/1W at ant, 60 cm dish. Tks for info Roger.

*HB9MIN wkd:* 22.08.94 PA0BAT JO31, PA3FPQ JO21, PA0EZ JO22, DK3UC JO42, DJ5BV JO30, DL1BKK JO43, DC8VJ JO31, DL3YEE JO42. Tks for info Erich.

*I0HP + I0LVA and IK0HWJ wkd:* 19.06.94 S53N JN65, I3ZJL/3 JN55, IK4OMN JN64, OE8MI/8 JN66, IS0DKU/IS0 JM49, I3DRE/3 JN65, S51WI/p JN75, IK4NMF/5 JN54, IW4BTJ/4 JN54, IK2LNT JN54, I4QIG/4 JN54, I2MUT/2 JN55, IW2GYI/2 JN55, I3CLZ/3 JN55, I3OPW/3 JN65, S51JN/p JN65, IV3DEW/IV3 JN65, IW2BNA JN45, HB9SV JN45, I4BER/4 JN54, I4XCC JN63. TX: 1W, RX: NF 1 db, Ant: 60cm dish. Tks for info Ricci.

*I0LVA JN62KA wkd:* 15.07.94 TK/HB9MMM JN42, and in JN62CH 10.08.94 IK2MMB JN45, 12.08.94 I3EME/IT9 JM68, I6CXB/6 JN63, I3ZH/3 JN55, 13.10.94 I3EME/IT9 JM68, I6CXB/6 JN63, I6XCK/6 JN63, IW5ADB/5 JN53, I3EME/IT9 JM68, and in JN62AX 15.08.94 I3EME/IT9 JM68, 18.08.94 I3EME/IT9 JM68, IK4OMN JN64, 21.08.94 I4QIG/4 JN54, 23.08.94 IS0DKU/IS0 JM49, IK4DCO/6 JN63, I3EME/IT9 JM67, I6XCK/6 JN63, IK2OFO/IA5 JN52. TX: 1W, RX: NF 1 db, Ant: 1.8m. Tks for info Ricci.

*OZ2OE JO45VV Wkd:* 13.10.94 PA0EZ JO22, DB6NT/a JO50, DL3YEE JO42, PA3DIJ JO33, DC0DA JO31, DK1UV JO41, DF9LN JO31, DL6NAQ/p + DC9BU/p + DG7NBE/p JO40, 14.10.94 DB1BX JO32. TX: 0.4W, RX: NE32684, Ant: 45cm dish. Tks for info Ole.

*PA0BAT JO31 wkd:* 27.06.94 LX1DU JN29, DL3NQ JN49, G4BRK IO91, 03.07.94 DF0CI JO51, ON7WR JO20, G3YKI/p JO01, 13.07.94 G3LQR JO02, 14.07.94 DF9QX JO42, G3LQR JO02, 28.07.94 DL1BKK JO43, 04.08.94 G4BRK, G3LQR, G3WDG IO92, 22.08.94 HB9AMH/p HB9MIN/p JN37, HB9RG JN47. 01.10.94 DL1BKK JO43, OS4CP/A JO20, DF0SSB/p JO40, ON7WR JO20, 13.10.94 G4CBW IO83 (604 KM), G3ZTR IO94, G3PHO IO93, G4PMK IO93, PA0GUS JO23, DK1KR JO53, DL2NUD JO63. Tks for info Gerard.

*TK/HB9MMM/p JN42MM wkd:* 03.07.94 IW4BTJ/4 JN54, 09.07.94 I6CXB JN63, 13.07.94 F6CGB/p JN12, and in JN42RU wkd: 15.07.94 I0LVA/0 JN62, 16.07.94 I6CXB/6 JN63, 17.07.94 IW2BNA JN45, IK2MMB JN45. TX:1W, Ant: 90cm dish. Tks for info Peter.

## 24192 MHz

*F/DJ7FJ/P JN37NV wkd:* HB9MIN/p JN37, HB9GBT JN37. TX: 50mW, Ant: 90cm dish. Tks for info Joe.

## News:

New telephone for G4PMK is +44 116 273 6326 (because of new UK prefixes).

DL5KVD beacon, revised data:

Msg: "TEST DL5KVD JO64AD ", Freq: 10368.020 MHz, TX: 0.2 W, Ant: WG16 Slot, omni, Loc: JO64AD 70m ASL.

### *DJ8ES: 1st rainscatter QSO on 10 GHz:*

Friday, June 24. 1994: Summer in north Germany. Until now not much sun, but today we have 26 deg C. Such weatherconditions promise good propagation over the North and Baltic sea. Looks as other had similar ideas, station after station turns up on 70 cm. However all looks normal, DL1BKK, DC6UW and OZ2OE go normal reports. Then DL5KVD in Rostock JO64AD moves my S-meter needle into the corner ! Wonderfull, lets now go to 10 GHz! But first down to earth: DL5KVD not currently QRV, DL1BKK and OZ2OE negative, only DC6UW but with normal signal. Next meeting the day after, 21.30 local, same frequency. The saturday evening started as the Friday ended...no tropo !. Several stations on the band, but no extraordinary signals. Suddenly, a call from DL1BKK: I see a remarkable (rain)front over the sea. Point your 10Ghz antenna in that direction, my call is on '100. Done as requested. The signal sounds like aurora; typical rainscatter. The first QSO took just one minute, 579/579, the next one followed immediately after with DL5KVA/P 519/519 and DL5KVD/a jonned the 'pile up' with 559/529. All stations could get in contact. That was unexspected strees on 10 GHz, nevertheless some time was left to investegate the rainscatter effects. The mode of operation was new for three of the participating stations.

## IK0HWJ on Monte Nerone

Conclusion: Terrific !

Equipment used at DJ8ES: TRX: DB6NT trans, TX: 0.5W, Ant: 40cm dish, 32 ASL.

**73 John OZ1IPU**

## Microwave: World Firsts and World Records

| Band [GHz] | World First QSO | | | World Record | | |
|---|---|---|---|---|---|---|
| | Date | Calls | QRB [km] | Date | Calls | QRB [km] |
| 10 | 6.V.1946 | W2JRM-W2JN | 3.3 | 18.7.1983 | EA9/I0SNY-I0YLI/IE9 | 1666 |
| 24 | 14.IX.1975 | G3BNL/P-G3EEZ/p | 150 | 3.II.1993 | HB9MIN/p-DH6FAE/p | 396 |
| 47 | 3.X.1984 | HB9AMH-HB9MIN | 1 | 15.IX.1992 | HB9MIN/p-HB9MIO/p | 166 |
| 76 | 30.12.1985 | HB9MIN-HB9AGE | 0.5 | 13.VII.1994 | DB6NT/a-DL1JIN/p | 77 |
| 145 | 12.VII.1992 | DB6NT/p-DL1JIN/p | 1 | 2.VII.1994 | OZ1UM/p-OZ9ZI/p | 11 |
| 241 | 23.V.1993 | DB6NT/p-DL1JIN/p | 0.1 | 30.VI.1993 | OZ/DB6NT-OZ/DF9LN | 0.5 |

If you have an update or a correction, please write to:
John Sørensen, OZ1IPU, Rosenvej 49, DK-9300 Sæby, Denmark.Tel.: (++45)9846-3311

# Microwave USA

**Editor: Kent Britain, WA5VJB**

## 10GHz

A new North American 3 cm record was set August 26th when WB6CWN and N6XQ/XE2 completed a 1123 km CW QSO. N6XQ/XE2 had been hearing WB6CNW 15 watt station for 2 1/2 hours before evening conditions improved enough to hear N6XQ's 1 watt signal. Both stations were using 4 foot dishes.

I had a miserable 3cm EME QSO with PA3CSG 30th of October for country #6. Signals were fine, but the moon was at 3 degrees, it was 4 AM, the dish was wet, the rigs were wet, and I was wet. That morning I heard 6 different stations on 3 cm off the moon, activity is really growing. I would suggest that the F???? operating at 10368.125 MHz slow down at bit, 15 wpm CW is difficult to copy at 4 AM and 3 dB out of the noise. 3 cm EME does not experience the dah chopping experienced on 432 MHz EME from libration effects, so there is no advantage to higher CW speeds.

3 cm EME signals from WA7CJO recorded by WA5VJB during the REF EME Contest have been digitized and processed through a FFT program. The 3 cm CW signals were 12 dB above the noise and 280 Hz wide. In many tests with variable filters, it seemed that bandwidths less than 1000 Hz actually make the signals more difficult to copy.

WA7CJO also reported a new 3 cm EME initial and continent when he worked VK2ALU. Lyle was using a 6 foot dish, G3WDG transverter and HEMT, and 16 watts output. Signal reports were M/M (Editor's note: not M/57 ?) VK2FZ and VK2AXA are nearing completion of a second Australian 3 cm EME station using a 3.7 Meter dish, SSB transverter, and 40 watts out.

The first tapped Cavity Preamp for the MFG1801 was designed and built by WA7CJO. Additional calculations by Jim have shown that a 70 Ohm cavity will have .03 to .05 dB less loss than the 50 Ohm cavity used in the earlier versions. Just use a slightly smaller center conductor in the cavity.

## Microwave UpDate 1995

Microwave UpDate 1995 will be held the 27th and 28th of October, 1995 in Arlington, Texas. The conference facilities of LaQuinta Inn are 7 km from the Dallas-Ft.Worth Airport. LaQuinta provides a free bus service to and from the airport. Within a short walk of the conference there are 11 different restaurants. The early list of speakers include JE1AAH, G3WDG, N6CA, WB5LUA, and WA5VJB. Technical workshops on circuit and feedhorn design are planned. Talks will cover terrestrial and EME topics for the amateur bands above 900 MHz. WB5LUA will be handling registration information, additional overseas speakers are welcomed.

WB5LUA should have his 9 cm EME station on the air by the end of November and hopes to be 6 cm EME capable by the end of the year.

**WB5LUA and WA7CJO checking Toshi's Preamp on 24GHz**

# Microwave Japan

Editor: Toshihiko Takamizawa, JE1AAH

## New 10GHz record from Mount Fuji

It was made this September by JH1UGF/1 and JR3EDZ/5 over 420Km path. JH1UGF climbed up to TOP of mount Fuji 3776m ASL and JR3EDZ climbed up to TOP of mount Kenzan at Shikoku island 1900m ASL. Signal was about 10 to 20dB above noise level with large QSB. They used F3. It is not shure right now if they made second contace to be comfirmed as a record but it is the first over 400km QSO in Japan on 10GHz.

Equipments used are MGF1601 200mW/ MGF4917 several dB NF with 40cm at mount Fuji end and FLX102MH-12 1W/??dB NF with 60cm at Kenzan end. As we do have only few(upto 10 to 20 or less) 10GHz home stations in Japan, mountain top is good opportunity to make SHF record. (It is 4 to 6 hours to climb up Mt. Fuji from car park at 2000m. No cable available. It is real mountain climb. JH1UGF is 6? years old!)

## Above 24GHz in Japan

### Hardware:

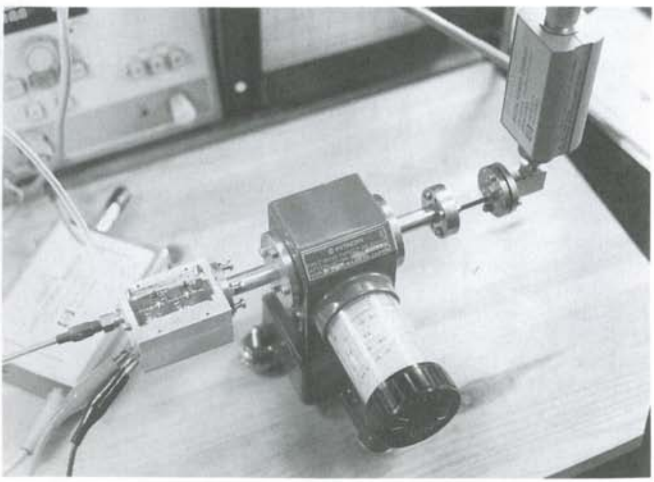
Right now, only available 24GHz ready-to-go PCBs are from JE1AAH myself and from JA3PFD. It is a set of each functional blocks. We do not have 47GHz PCB right now but I am planning x2 multiplier for 45 to 47GHz output range for LO and/or transmitter upto 2mW. Suitable machine milled cases are also available.

### Operation:

Few years ago a group in kansai area was very active on 24GHz FM-ATV and made a record about 150km using ex-commercial equipment. Also a group in Kanto area made a current maximam 24GHz record of 220km from mount Fuji 2 years ago using JE1AAH board at one end. Since these activities it has been quiet for 24GHz. Several groups are trying to produce 47GHz signal using home brew gear. However I haven't heard any 47GHz contact except JA8CMY officially.

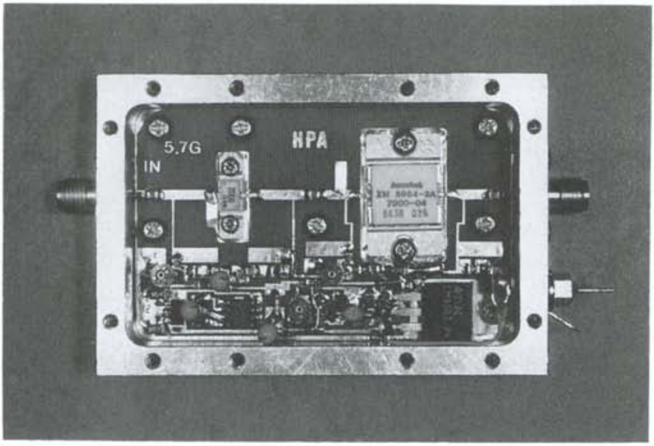
We are sometimes able to find second-hand ex-commercial gears for 47GHz which are Gunn Osc, WG components, coupler, mixer, detector etc. However an active device is almost dead. Currently as 60GHz corrosion avoidance rader is being developed world widely by many car companies it will be possible to obtain surpluses from this market near future.

As I am being in touch with Japanese Millimeter wave component supplier I am able to get latest development information for this area.



Power Measurement for the 47 GHz Doubler

## 5.7GHz Power Amplifier




## Microwave committee in Japan

It is unbelievable but it is true that Japanese Amateur Radio League(JARL) haven't had Microwave Committee. This September it was established to reinforce/spread activity of microwave frequency in the amateur radio. It will be headed by JARL technical laboratory and have several committee members. I will be responsible to obtain world wide activity information in the UHF, SHF and EHF region.

There is no microwave contest in Japan, too. We have 6m and down(it means wave lengh less than 6m) contest for long time but no actual microwave(hopefully above 5.7GHz, real SHF region only) contest exists.

Since we have had ICOM IC-970 for 2.4GHz, ICOM/Kenwood/ Marantz for 1.2GHz, Maki for 5.6 and 10GHz, there has been increasing the band activity after those rigs were available.

The contest should push the activity in SHF.

## 10GHz EME

JA4BLC had a lot of demmand for 10GHz EME from Japan at EME conference in Sweden this August. Many friends have kindly offered to build a JA band(10.000 to 10.250) down converter. He then decided to build 10GHz equipment in the next 2 years. Recent report said VK station made first VK 10GHz EME with WA7CJO using 1.8m plus 16W. I think it is great possibility for JA, too. JA4BLC made several 2.4GHz EME QSOs this summer. 10GHz is go ahead right now.

## 500 plus one

JA1AN, a president of JARL for 24 years, has been writing VHF column in Japanese CQ ham radio magazine for over 40years. This October it was 500 anniversary. He started his VHF activity at 6m around 1953 using triode. His column is now classic of JA VHF people. I was surprised that they were using HARMONICS mixing at 6m using 1N56 driven by 25MC(not MHz) x'tal OSC which was all solid state in 1958.

This month the report is focusing into non technical issues.

**VY 73 JE1AAH**

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## Technical Reports



## Hints & Kinks

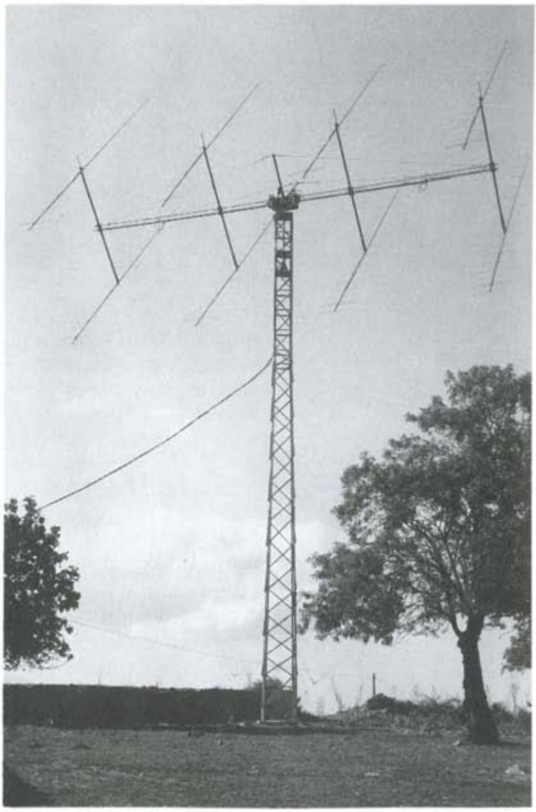


## Miscellaneous

# EME News

Editor: Bernd Wilde, DL7APV

*Intro:* The **ARRL** part I is over and part II is still in progress. Bad to fair condx were reported during part I. A big aurora happened on Saturday in Europe. VE3ONT was not qrv due to commercial schedules of the dish. Wether they are qrv at ARRL part 2 is not confirmend yet. Due to the limited number of pages for this column some infos had to be cut.



EA6VQ's 2m 8-Yagi moon ears

## 50MHz

*I5MXX wkd:* 22.05. VE6JW, 29.10. K6MYC, K6QXY, 30.10. OZ5IQ, WA4NJP, OH2BC. rig 4x9el 12m boom with elevation. Marzio is looking for skeds on 50.161; FAX: ++39 572 950092 or tel: ++39 572 80105. tnx fer info Marzio.

## 144MHz

*HB9CRQ wkd:* CT1WW, VP2V/K6MYC, SV1BTR, IW1CGB, DJ5RE, JX7DFA (DXCC#101!), K3HZO and F9HS #613. Dan feels that the long hot summer dropped activity. tnx fer info Dan

*I2FAK wkd:* new initials AA8BC, F5GHP, UT1PA, ON4QQ, DF0DX, DL0WAE, YL3AG, 9H1BN, YU1IO, IK0PCJ, DL1KDA, EA3KE, SV5/DL6RAI, I1PIK, SM4HFI, GJ4AFF/p, S50C, VP2V/K6MYC, UR5M, CT1WW, US1VQ (1Yagi), G4YTL (1Yagi), 4K6D (1Yagi), JX7DFA (country #100!) and #717. tnx fer info Franco

*I4XCC wkd:* 20.08.94 GM4JJJ #108, 21.08. WA3HMK, W4ZD. tnx fer info

*IK0IXI wkd:* 14.07. IW5AVM O/O #1. Fabio is a EME novice and needs skeds via VHF-net or via IW5AVM. rig 2x17el f9ft full el, MGF1302, 4CX250 300w. addr: Fabio Bonucci, via Umbria 4, I-00053 Civitavechia ITALY. tnx fer info Fabio

*IN3TWX wkd:* 01.01.94 SM5MIX, JL1ZCG #111, ARRL 1 : SM5FRH, DL8DAT, W5UN, K5GW, KB8RQ, I2FAK, F3VS, HB9CRQ, hrd VE1ZJ, SK7CA(SM7GVF), WA3HMK cwnr 2h, LA8YB, S51WV, IK3MAC, OE5JFL. tnx fer info

*JA9BOH wkd :* 03./.04.09. SM5MIX nil, DJ9CZ O/O #27, DL3BWW O/O #28, ON4GG nil QRN, ON4ANT nil QRN, DK4TG QRT because he was not on, N6OC nil, W8WN O/-heard his sigs, PA0JMV nil but hrd own echoes, W4ZD nil again strong S-7 sun noise. 25.09. JA4BLC 539/O #29, W9QXP O/O, 30.09. W7HAH O/O, #30 01.10. 9A1CCY nil, DK4TG nil, ON4ANT O/-, ON4GG O/O #31, PA0JMV O/O #32, EI4DQ nil, OK1MS O/O strong but bad keying #33, N1BUG nil, K1MNS O/O #34, K0KKV O/O #35, WA3HMK O/O #36, W4ZD O/O #37, W8WN nil, W2CRS O/-, JL1ZCG O/O, N6OC O/O #38. tnx fer info Kimio

***JA2JRJ wkd :*** 23.09. DK4TG nil, W9QXP nil QRM, 01.10. all EU skd was blocked by illegal FM and only worked N1BUG.

***JW0BY (JQ88ad) wkd :*** almost random 16.-19.10.94 SM5BSZ, I2FAK, SM5MIX, DL5MAE, PE1AGJ, SM5FRH, SM2CEW, HB9CRQ, K2TXB, DL8GP, KB8RQ, DF8LC, DL3BWW, G4SWX, ON4ANT, ON4GG, DL1MAJ, PA2CHR, VE7BQH, JA4BLC, LA8YB, I5JUX #22. NC were G3IMV, PA0JMV, DF7KF. Stefan's (LA0BY) location is Svalbard, near Longyearbyen on top of a 430m mountain(see photo). Due to the exposed location extreme wheather conditions have to be expected. The temperature may drop down to -35°C and snow covers the ground for at least 10months a year. The ground is permanently frozen. There is no sun from mid october to mid february. rig: TS430S+270Hz NF+LT2S 2m transv. + PA hb 1KW + preamp 0.4dB. Further operations planned for 1995 as well as for ARRL part2 on .025 or .155. **Random** operation is preferred. Skeds and operation times via EME-NET or via E-Mail stefan@eiscat.no.. qsl only direct to Stefan Heck, LA0BY, Floyvegen 25, N-9020 Tromsdalen, Norway. many tnx for your cold report Stefan

**JW0BY's 4x17el in the last sunlight this year (17.Oct.94)!**

**N7ART inside his new dish, to be continued ?**

## 144MHz netnews

JX7DFA Per-Einar IQ50ov became qrv with 4x15el. & 1KW, K5GW & WB5LBT will go to Nebraska on 01.&02.10., UT5EC wkd : 10.08.94 I2FAK.

## 432 MHz

***DK0NHF wkd:*** during ARRL part I SM4IVE, OE5JFL, DL9NDD, DL9KR, PA3CSG,

SM0PYP, I5MPK, F1FEN, OK1CA, F1ANH, NC1I, N4GJV, N2IQU, K1FO, KD4LT, K0RZ, K2UYH, EA5CJ, OH2PO, WD5AGO. rig 8x21el, .45dB, 700W.

***JA5OVU wkd :*** 24.09. K1FO 569/549, 01.10. NC1I 579/569,K0RZ 559/559, 02.10. ON4KNG #43, W0KJY 559/539 #44 and hrd VE7QH 339.

***JA9BOH wkd :*** in the ARRL 1 29.10. SM4IVE O/O, DL9KR 559/559, DL9NDD 339/449, VK3UM 559/449, DJ6MB 549/529, F1FEN 569/559, OE5JFL 559/549, JL1ZCG O/O, NC1I 559/539, N4GJV 449/459, KB4WM O/O, KB8ZW O/O, K1FO 569/559, 30.10. OH2PO 569/559, W7CI 559/559 for 15x11. hrd were JA4BLC, JA2KRW, JA5OVU, JA2JRJ, S57QM, DL8OBU, VK2NDD, K5JL, W7HAH, tnx fer info kimio and he wants sked with DL8OBU, VK2DND. tnx fer info Kimio

***JH4JLV wkd :*** K1FO, SM4IVE, F1FEN, DL9KR, NC1I #17, JA5OVU #18. He had a HPA breakdown before the contest and operated with 400W out.

***JA2KRW wkd :*** ARRL1: 28 stations including 7 initials 29.10. F1FEN 559/449, SM4IVE 559/O, DL9KR 579/569, OE5JFL 559/449, DL9NDD 449/449, DJ6MB O/O, I2COR 559/559, I5MPK 559/559, N4GJV 559/449, NC1I 579/559, JL1ZCG 559/549, K1FO 579/549, KB8ZW #59 O/O, K0RZ 549/449, JA5OVU 549/549, W7CI #60 O/O, JA4BLC 559/559, 30.10. UR5LX O/O, OK1CA O/O, DL6LAU #61 559/449, DF6NA O/O, DL3BWW 549/549, DL8OBU #62 449/439, DL6WU 449/449, SM3AKW #63 O/O G4RGK #64 O/O, I5CTE #65 O/O, OH2PO 559/559. tnx fer info

***OK1CA (JO70gm) wkd :*** 04.12.93 OK1KIR O/O, K1FO 559/439, I5MPK O/O, KB2AH 559/549, 20.01.94 DF3RU 449/439, VK3UM 559/339, EA2LU O/M, JA2JRJ O/O; W1ZX O/O, K0RZ O/O, K4QIF 559/339, W7CI O/O, 9M2BV O/O, UT5EC O/O, 30.01. UA6LGH O/O, K2UYH 559/549, 18.03. K5JL 449/339, 19.03. HB9SV O/O, VE1ALQ O/O, WA9FWD O/M, W2UHI O/O, W0KJY O/O, UT5DL 449/339, 16.04. JA4BLC O/O, EA5CJ O/O, SM4IVE 569/529, G3SEK 559/339, DL9KR 579/549, DL3BWW O/O; EA3UM O/O, SM2CEW 559/439, F1JZG 559/559, N4GJV 559/549, SM0PYP 549/O, JA2JRJ O/O, 17.04. JA2KRW O/O, ZS6AXT O/O, 13.05. KD4LT459/449, UR5LX O/O, 14.05. JA9BOH O/O, IN3HER O/O, 03.09. NC1I O/O, ON4KNG O/O. tnx fer info Franta

***ON4KNG wkd :*** oct'94 NC1I, OE5JFL, GW3XYW, K0RZ (SSB 41/52), JA5OVU, SM4IVE. hrd: ZS6AXT. tnx fer info Peter

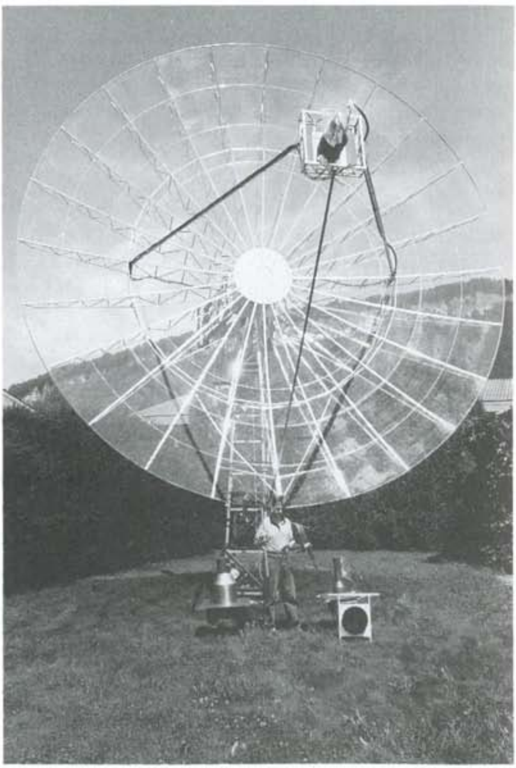
***PY5ZBU wkd so far:*** F1FEN, DL9KR, NC1I, K1FO, KD4LT, SM4IVE. tnx fer info to KD4LT

## netnews 432&up

JQ2UFN 12-FO25 wkd SM4IVE and near miss to DL9KR, JG3UVN 4-31el wkd DL9KR and SM4IVE. Both used 50W RF.

## 1296 MHz

***EA/DF5JJ wkd:*** 27.4.94 N2IQU, WB5LUA, 28.8.94 I6PNN, 3.9.94 LA8LF, SM0PYP, KB2AH, IK3COJ, DL0SHF #, 4.9.94 OK1KIR, HB9BBD, I6PNN, ZS6AXT, IK3COJ, OZ4MM, VE1ALQ #, 15.10.94 F5PL, 21.10.94 DJ9YW,



**Erich, OE9ERC, in front of his 8m dish (f/D=0.51)**

## Lunar Weekend Calendar 1995

| Date | Declination/° | Signals(dB) | Sun offset/° | Sky Temp /K 144/432MHz | Comments |
|---|---|---|---|---|---|
| 07/08. Jan. | +6.3 | -1.54 | -95 | 300/24 | day PM |
| 14/15. Jan. * | +19.5 | -1.76 | -155 | 550/42 | night, apogee |
| 21/22. Jan | -4.3 | -0.44 | +150 | 307/23 | night |
| 28/29 Jan. | -18.4 | -0.23 | +60 | 1869/129 | moon in south, |
| 04/05. Feb. | +8.7 | -1.6 | -50 | 320/25 | sun noise |
| 11/12. Feb. * | +18.5 | -1.71 | +145 | 459/35 | day PM, apogee |
| 18/19. Feb. | -7.3 | -0.36 | +163 | 360/27 | night |
| 25/26. Feb. | -16.8 | -0.30 | +79 | 591/51 | moon in south, perigee |
| 04/05. March | +10.8 | -1.67 | -36 | 340/25 | day AM apogee |
| 11/12. March * | +17.2 | -1.65 | -130 | 401/29 | day PM, apogee |
| 18/19. March | -10.1 | -0.28 | +174 | 356/26 | moon in south, night perigee |
| 25/26. March | -14.5 | -0.38 | +85 | 412/31 | moon in south |

The sked weekends were **proposals** by G3SEK and are marked with an asterix.

**Summary by G3SEK:** Most months have two non-ideal possibilities for the skeds weekend. One is at high declination, but close to perigee and with some additional degradation due to sky noise. The other is at low declination, but less total moon time, and more time when signals are affected by ground noise.Perigee is still at unusable negative low declinations, and will be for some years to come. If we want high declination (more moon time for most people) we have to accept the additional path loss of 1-1.5dB. An additional complication for 1995 will be that high declination weekends also have a rather high sky noise temperature. For a low-noise 432MHz system (Tsys=80K) the additional s/n degradation will be about 0.5dB.

Sky noise is a much bigger problem on 144MHz, so the ARRL EME contest may have to consider the alternative weekends with lower sky noise - but also lower declinations and less moon time. Unfortunately these clash with the major all-European contest weekends on 7/8 October (432 and up) and 4/5 November (144 CW).Low declinations can be quite a severe problem. Not only is the moon visible for a shorter time, but it also spends a larger fraction of that time at low elevations where ground noise is a problem on 432 and up.

Finally, new moon (sun noise) makes its annual swing through the available weekends, reducing the options to one during April/May/June.

!! PLEASE CONSULT WIDELY BEFORE DECIDING SKED AND CONTEST WEEKENDS !!

DH0OAH (same), DJ5QK (same), DL3OCH (same), 27.10.94 JA4BLC #, JR4BRS #, 29.10.94 JA4BLC, VK5MC # (1 st VK-EA6), EA3UM, LA8LF, HB9BHU, DL9EBL, OZ4MM, HB9BBD, ZS6AXT, SM4DHN, OE9XXI, F5PL, OZ9AAR #, F6CGJ, DJ9YW, SM3AKW #, F5ELL, N2IQU, KB2AH, AA4TJ, AA6WI, 30.10.94 PA3CSG # (1 st PA-EA6), OE5JFL, OK1KIR, F1ANH, G3LTF, SM0PYP, IK3COJ, W7GBI #, PA3DZL #, K2UYH, 5.11.94 F1ANH, CX9BT # (1 st CX9-EA6, DXCC #21 and WAC). Now back in DL, preparing 13cm EME. Probably EME on 13cm from EA6/JM19LU in 4/95. New tel. and Fax: ++34-71-534498. Tnx for Info, Peter.

***HB9BBD wkd*** : 11.06. AA6WI 549/539, 12.06. ZS6AXT 439/549, DL0SHF # 419/529, 04.09. G4CCH # 319/O, EA6/DF5JJ 319/339, LA8LF 529/O, ZS6AXT 319/529, OK1KIR 219/439, SM0PYP 539/569, OZ4MM 559/559, 01.10. JA4BLC # 539/549, JH3EAO # 429/O, JR4BRS # 419/559, AA4TJ # 319/549, AA6WI 429/539, KB2AH 559/539, 02.10. F1ANH 539/549, LA8LF 529/559, ZS6AXT 419/429, HB9BHU 519/539, AA6WI 539/549, F1ANH 51/52 ssb ran-

## EME-TOPLIST

### 144MHz

| Call | small | SQR | DXCC | States | WAS | WAC |
|---|---|---|---|---|---|---|
| I2FAK | 390 | 51 | 83 | 50 | 1993 | 1988 |
| HB9CRQ | 349 | 52 | 84 | 49 | -- | 1987 |
| DL3BWW | 333 | 46 | 72 | 50 | 1992 | 1983 |
| UA9FAD | 320 | 37 | 53 | 35 | -- | Yes |
| PA0JMV | 251 | 44 | 64 | 50 | 1993 | 1988 |
| F6IRF | 171 | 29 | 41 | 32 | -- | Yes |
| UA3TCF | 145 | 0 | 30 | 0 | -- | -- |
| UZ3FWA | 114 | 0 | 28 | 0 | -- | -- |
| RA3YCR | 109 | 0 | 33 | 24 | -- | -- |
| RA3LE | 94 | 0 | 0 | 0 | -- | -- |
| DK9ZY | 89 | 23 | 24 | 16 | -- | yes |
| EA6VQ | 84 | 22 | 26 | 0 | -- | -- |
| LA0BY | 83 | 27 | 29 | 20 | -- | -- |
| SM0PYP | 76 | 19 | 28 | 15 | -- | -- |
| SP5EFO | 74 | 21 | 28 | 13 | -- | -- |
| UV1AS | 52 | 0 | 21 | 0 | -- | -- |
| UA9XEA | 49 | 0 | 20 | 0 | -- | -- |
| SP5CJT | 44 | 14 | 17 | 11 | -- | -- |
| DL7AKA | 32 | 14 | 12 | 10 | -- | -- |
| DL7UTS | 29 | 10 | 13 | 10 | -- | -- |
| F5HRY | 20 | 0 | 8 | 7 | -- | -- |
| IK5OIY | 19 | 13 | 9 | 5 | -- | -- |
| DL5DTA | 18 | 9 | 8 | 4 | -- | -- |
| UA3MAS | 11 | 0 | 5 | 0 | -- | -- |
| DL3YEE | 6 | 3 | 5 | 1 | -- | -- |
| HB9DFG | 3 | 3 | 2 | 2 | -- | -- |
| UA6LGH | 2 | 0 | 1 | 0 | -- | -- |
| DF8LC | 1 | 1 | 20 | 0 | -- | -- |
| DL8EBW | 1 | 1 | 1 | 0 | -- | -- |

### 432MHz

| Call | small | SQR | DXCC | States | WAS | WAC |
|---|---|---|---|---|---|---|
| DL9KR | 325 | 47 | 73 | 50 | 1987 | 1978 |
| SM0PYP | 290 | 40 | 50 | 42 | -- | 1989 |
| DJ6MB | 231 | 34 | 56 | 39 | -- | 1984 |
| OK1KIR | 222 | 39 | 57 | 43 | -- | 1982 |
| DL3BWW | 196 | 36 | 51 | 38 | -- | 1991 |
| RA3YCR | 187 | 0 | 46 | 33 | -- | -- |
| UA6LGH | 163 | 0 | 38 | 0 | -- | -- |
| OE9ERC | 126 | 0 | 0 | 0 | -- | 1993 |
| UA9FAD | 120 | 24 | 34 | 26 | -- | -- |
| YO2IS | 99 | 19 | 31 | 21 | -- | -- |
| SP5CJT | 94 | 24 | 28 | 26 | -- | -- |
| OE9XXI | 93 | 27 | 29 | 23 | -- | 1983 |
| RA3LE | 92 | 0 | 0 | 0 | -- | -- |
| DL3YEE | 90 | 22 | 32 | 15 | -- | -- |
| OK1CA | 52 | 0 | 20 | 13 | -- | -- |
| EA6/DF5JJ | 37 | 15 | 14 | 0 | -- | -- |
| UA3TCF | 30 | 0 | 11 | 0 | -- | -- |
| UA9XEA | 23 | 0 | 11 | 0 | -- | -- |
| HB9CRQ | 20 | 13 | 12 | 9 | -- | -- |
| DF8LC | 9 | 5 | 7 | 0 | -- | -- |
| F5HRY | 4 | 0 | 3 | 2 | -- | -- |

### 1296MHz

| Call | small | SQR | DXCC | States | WAS | WAC |
|---|---|---|---|---|---|---|
| OE9XXI | 160 | 28 | 33 | 24 | -- | 1989 |
| OE9ERC | 137 | 23 | 25 | 21 | -- | -- |
| SM0PYP | 100 | 21 | 26 | 15 | -- | 1989 |
| OK1KIR | 93 | 24 | 28 | 18 | -- | 1989 |
| EA6/DF5JJ | 55 | 17 | 21 | 10 | -- | 1994 |
| OE9FKI | 48 | 9 | 17 | 10 | -- | -- |
| HB9BBD | 41 | 37 | 17 | 5 | -- | -- |
| DF5JJ | 13 | 6 | 7 | 2 | -- | -- |
| DL3YEE | 9 | 6 | 6 | 1 | -- | -- |

### 2300MHz

| Call | small | SQR | DXCC | States | WAS | WAC |
|---|---|---|---|---|---|---|
| OE9XXI | 35 | 13 | 15 | 9 | -- | -- |
| OE9ERC | 29 | 12 | 15 | 7 | -- | -- |
| OK1KIR | 25 | 9 | 11 | 8 | -- | -- |
| SM0PYP | 21 | 9 | 11 | 7 | -- | -- |
| OE9FKI | 3 | 3 | 3 | 1 | -- | -- |

### 5750MHz

| Call | small | SQR | DXCC | States | WAS | WAC |
|---|---|---|---|---|---|---|
| OE9ERC | 2 | 1 | 2 | 0 | -- | -- |

### 5760MHz

| Call | small | SQR | DXCC | States | WAS | WAC |
|---|---|---|---|---|---|---|
| OE9PMJ | 2 | 1 | 2 | 0 | -- | -- |
| OE9FKI | 1 | 1 | 1 | 0 | -- | -- |

### 10368MHz

| Call | small | SQR | DXCC | States | WAS | WAC |
|---|---|---|---|---|---|---|
| DJ7FJ | 10 | 0 | 8 | 3 | -- | -- |
| OK1KIR | 5 | 5 | 5 | 1 | -- | -- |
| OE9ERC | 3 | 3 | 3 | 1 | -- | -- |

dom!, F2TU 549/549, DJ8YW #41 529/O. rig 1.5kw, 2.4m dish, 0.3dB NF, sun 10.5dB, moon noise 0.2dB. tnx fer info Dominique

***JA4BLC wkd :*** 22.10. EA6/DF5JJ 549/O #19, LA8LF 549/549, DJ9YW O/O #20, 23.10. WB5LUA 449/449 #21, OE9XXI 569/559 & 55/54, OE9ERC 44/44 his SSB #4. tnx fer info

***OE9XXI wkd :*** 21.08. I6PNN 43/54, W2UHI 449/559 #170, 08.09. DJ5QX 449/539 (3,5m dish 55w JO41), DJ9YW 439/559 (3,5m dish JO41), 10.09. OE9ERC 579/559, 19.09. OZ9AAR O/O (5m dish 15w) #173. Peter was very pleased by a visit from JA4BLC & son, JR4AEP and JF3HUC. 29.09. F1SDR 54/55 #174, 01.10. HB9BHU 54/56, ZS6AXT 44/55, LA8LF 44/55, OZ9AAR

## Results of the first Italian EME Contest

| 144MHz | Call | ant. | QSO's | Points | I-QSO's |
|---|---|---|---|---|---|
| Cat. F | W5UN | 36x17el | 79 | 990 | 10 |
| Cat. E | K2GAL | 168el. | 20 | 280 | 4 |
| Cat. D | LA8YB | 8x17el | 51 | 710 | 10 |
| | S57TW | " | 31 | 450 | 7 |
| | EA6VQ | " | 29 | 430 | 7 |
| | JL1ZCG | 104el. | 20 | 300 | 5 |
| | DL5MAE | 8x17el. | 13 | 230 | 5 |
| | W0HP | 96el. | 12 | 160 | 2 |
| Cat. C | SM5BSZ | 4x14el. | 75 | 930 | 9 |
| | LZ2US | 4x19el. | 40 | 540 | 7 |
| | PA3EPD | 8x10el. | 40 | 540 | 7 |
| | DL7AKA | 4x15el. | 21 | 290 | 4 |
| | DJ7OF | 56el. | 12 | 200 | 4 |
| | 7K3LGC | 4x12el. | 10 | 180 | 4 |
| | F9HS | 48el. | 10 | 160 | 3 |
| | JA4BLC | 4x17el. | 9 | 130 | 2 |
| | LZ1DP | 4x17el. | 8 | 100 | 1 |
| | JE1BMJ | 4x13el. | 8 | 100 | 1 |
| Cat. B | DK9ZY | 4x10el. | 27 | 370 | 5 |
| | DL0WAE | 4x9el. | 20 | 280 | 4 |
| | EA3DXU | 2x17el. | 15 | 210 | 3 |
| | EA3EHQ | 2x18el | 9 | 150 | 3 |
| | DJ5MN | 2x17el. | 2 | 40 | 1 |
| | DL5MAE /qrp | 2x17el. | 2 | 20 | - |
| Cat. A | UT8AL | 1x20el. | 10 | 120 | 1 |
| 432MHzCat. A | N4GJV | 16x21el. | 26 | 340 | 4 |
| | JA4BLC | 7m dish | 6 | 60 | - |
| | ON5OF | 16x23el. | 6 | 60 | - |
| Cat. B | EA3DXU | 2x38el. | 9 | 110 | 1 |
| Cat. A | DJ5MN | 1x21el. | 1 | 10 | - |
| 1296MHz | OE9XXI | | 20 | 280 | 4 |
| | AA6WI | | 7 | 70 | - |
| 2300MHz | OE9XXI | | 1 | 10 | - |

| For regulation of the contest, the winner is : | | | | | |
|---|---|---|---|---|---|
| 144MHz | Cat. F | W5UN | | | |
| | Cat.E-C | SM5BSZ | | | |
| | Cat. B | DK9ZY | | | |
| | Cat. A | UT8AL | | | |
| 432MHz | Cat. D | N4GJV | | | |
| | Cat. B | EA3DXU | | | |
| | Cat. A | DJ5MN | | | |
| 1296MHZ | | OE9XXI | | | |
| 2300MHz | | OE9XXI | | | |
| **Italian Scores** | | | | | |
| 144MHz Cat. E | I2FAK | 16x18el. | 70 | 680 | |
| Cat. D | I5JUX | 8x20el. | 47 | 470 | |
| Cat. C | IK1MTZ | 4x17el. | 35 | 350 | |
| | IK1FJI | 4x18el. | 30 | 300 | |
| | I4XCC | 4x17el. | 19 | 190 | |
| | IK2DDR | 4x17el. | 12 | 120 | |
| | I1ANP | 4x15el. | 4 | 40 | |
| | I5WBE | 4x20el. | 2 | 20 | |
| Cat. B | IK5UBM | 2x17el. | 6 | 60 | |
| | IW5CNS | 2x12el. | 3 | 30 | |
| 1296MHz | IK3COJ | | 6 | 60 | |
| 2300MHz | I6PNN | | 2 | 20 | |

The price distribution of the first contest will take place at the 4 I-EME conference :13/14.05.95 to Hotel Joseph, Lido di Camaiore (LU).
rules : see DUBUS 1/1994 **excl.** :
**DATE & Time**
*start 00:00 21.01.95 to 00:00 22.01.95*
The end of acception logs is **02/95**

43/55, F1SDR 55/58, VE1ALQ 549/559 #175, AA4TJ 549/56, AA6WI 559/549, WA4OFS 449/559, 02.10. DJ9YW 44/55, DH0OAH 44/55 same as dj9yw, AA6WI 559/549, W2UHI 439/559, OZ9AAR 43/55, 08.10. I6PNN 549/559, 23.10. G4FUF 439/559 #176, JA4BLC 559/569, OE9ERC 56/57, DL6YDH 549/O same as dj9yw, EA3UM 549/569, DJ9YW 549/559. In ARRL part 1 they made 47x28 incl K3EAV as # 177. tnx fer info Peter

***OE9ERC wkd:*** initials 24.11.93 VK1VP #104, 27.11. PA3SCG, 28.11. K0RZ, EA4LY, DK0OG, 29.11. WA2LTM, 05.12. OZ4MM, WA6MGZ, 06.12. K9BCT/4, 11.12. WA4NJP, 09.01.94 OE9HHV, 06.02. DJ9PC, OE3JPC, 12.02. I0UGB, N4MW, 19.02. N8DJB, 20.02. WA7BBM, 26.02. W3KWH, IK3HHG, 04.04. F6HYE, 17.04. JA8ERE, 23.04. WA8WZG, 01.05. DK2GR, 16.06. DL0SHF, 17.06. K9ZZH, 16.07. DL3IAS, 11.09. DJ9YW, 19.09. OZ9AAR, 24.09. G4DZU, W2UHI, 25.09. KA1OTP, 01.10. F1SDR, VE1ALQ #137. rig 8m dish, 1KW,

# Rules European EME CONTEST

## Sponsored by REF and DUBUS

This contest is intended to encourage worldwide activity on moonbounce. The rules for multipliers give equal chances for stations from N.A., Europe and Oceania. The rules encourage random QSOs for all bands below 2.3GHz.

**1. Contest Dates & Periods** The contest happens during two full weekends. Dates correspond to activity weekends of March and April. These are selected 3 months in advance for optimum performance. Each leg begins at 00:00 UTC on saturday and ends at 24:00 UTC on sunday.

**2. Bands**

| | |
|---|---|
| First leg: | 144MHz, 1296MHz. |
| Second leg: | 432MHz, 2300MHz and above. |

**3. Categories**

| | | |
|---|---|---|
| QRP | 144MHz | <100kW ERP |
| | 432MHz | <400kW ERP |
| | 1296MHz | <600kW ERP |
| | ≥ 2300MHz no specific class | |
| QRO | ERP greater or equal than stated above. | |
| PRO | Non amateur equipment or antenna. These stations will not be ranked. | |

**4. Exchange** Callsigns, TMO or RST

**5. Scoring** 100 points for each random QSO completed. 10 points for each sked QSO completed. The sked rule is only valid for all bands below 2.3GHz.

**6. Multipliers** Each DXCC country (except W/VE/VK) plus states worked in W/VK or provinces worked in VE. Multipliers count per band and only if worked by RANDOM. The RANDOM rule is valid for all bands below 2.3GHz. States and provinces have to be determined by address lists in Newsletters or in DUBUS.

**7. Total per band** Sum of points multiplied by sum of multipliers

**8. Final score** Total sum of points multiplied by total sum of multipliers.

**9. Classifying** Top score defines one winner total per band and one for multiband* class. No differentiation for multi operators.

* Multiband stations will also be classified on each separate band worked. Multi operators and QRO stations will be highlighted in the general classification.

**10. Reporting** Copy of the log for each band with details on points, multipliers and total points. The following information must be included: Output power, transmit cable loss, antenna type and gain. Working category: QRO/QRP, mono/multi operator, name(s) and underwritimg of operators, Locator/State. Other information is welcome: Comments, conditions, grid locator, station details, photographs, etc...

**11. Awards** A certificate will be sent to each entry. All (multi-)band winners will receive a trophy.

**12. Logs** Log entries must be postmarked no later than 30 days after the end of the second leg to the following address:

DUBUS Verlag,
EME Contest
P.O. Box 500368
D-22703 Hamburg
Germany
Fax: (++49)40-8508972, E-Mail: dk3uz@SYS-hh.hanse.de

## Rules European EME CONTEST (Cont.)

**13. Referee:** Responsible for rules and general questions is:

Ian White, G3SEK
52 Abingdon Rd.
Drayton, Abingdon, Oxon OX14 4HP
England
Tel.: (++44)1235-531559
E-Mail: g3sek@ifwtech.demon.co.uk

Good Luck in the Contest !

REF: Philippe Martin, F6ETI
DUBUS: Rainer Bertelsmeier, DJ9BV
Referee: Ian White, G3SEK

ATF10135 preamp. tnx fer info Erich. Packet: OE9ERC@OE9XPIAUT.EU.

## 2304/2320MHz

***OE9ERC wkd :*** 27.11.93 NU7Z #28 (3,3m dish&50w), 25.04.94 VE1BVL #29 (3,6m dish&20w) Erich will use a new preamp next and is interested in skeds. tnx fer info Erich

***JA4BLC wkd :*** 22.10. W4HHK O/M. tnx fer info

## 5760MHz

***OE9ERC*** is qrv on this band with his 8m (6mm mesh) dish and a modified W2IMU horn linear. He uses a WB5LUA preamp and has 30w TWTA. Erich copies 16dB sun/cold sky and 2dB moon noise. tnx fer info Erich

***OE9PMJ*** is now qrv on this band with a 8.84m dish (meshwidth 10mm) and a dual mode horn linear. He has sun noise abt. 16-17dB& 2db moon. He is using a WB5LUA preamp, MGF 4318 + ATF 10135 and a hb GaAs-FET PA with 45w. His new tel is 0043 5574 75330. They will use OE9PMJ or/and OE9YTV (Reinhilde) for 6cm. 19.09. OE9FKI M/M (3,8m dish, 9mm mesh, W2IMU horn, WB5LUA preamp, 30w FET PA) The manual adjustments were made by Reinhilde, Peter's xyl. 20.09. DL2GSG 449/559 #2. 15.10. OE9ERC 339/549 #3 (8m dish 5W !), sked with OK1KIR at 30.10. nc. tnx fer info Peter.

## 10 GHz

***DJ7FJ wkd:*** 03.09. with 50w and 4.5m dish vertical SM4DHN 539/539, K9KFR 549/549, G4KGC 539/549. Echoes were copied easy at this time. tnx fer info Joe. (sri für das falsche Rufzeichen im letzten Heft. red)

***OE9ERC*** is qrv on 3cm now. He uses a 4m dish with a linear horn. He has 15dB sun and about 2dB moon noise. The preamp is a wdg design & tx 25w TWTA. He will thank G3WDG, SM4DHN and DF7FJ for their help. Erich is interested in skeds, tel ++43-5574-79505 all time or fax -79771. tnx fer info Erich

## European EME Contest

Dates of the European EME Contest are **11/12 of March**, 1995 for the first leg (144, 1296) and **8/9 of April**, 1995 for the second leg (432, 2320 and above). See rules above.

## Last

The positive resonance at the meeting in Weinheim about the statistics and gossip column helped me to continue these parts of the EME column. In this issue was no room for the updates of the address list. The updated list is avaible in text format on the DUBUS mailbox.

***73 Bernd DL7APV***

# Tropo News

**Editor: Joachim Kraft, DL8HCZ**

## 2m > 700 km

***DD0VF, JO61VB wkd:*** 28.9.94 G1EUC 01. 29.9.94 F1CYB 17, G1EUC 01, G4UDE 82. 30.9.94 G4RKV 01. 13.10.94 G, GW, GM from JO01, 02, IO81, 85, 87, 92, 94. tnx for info, Steffen

***DF0DA/p in JO30JF wkd 700 km:*** 020794: S58A JN86CS, G4JBH/p IO80LV, G8IUB/p IO82LB, OE3XA JN88BA 030794: G0ROC/p IO83VP, GW3SRT/p IO82JQ, GD4XTT IO74TF, EI2WW/p IO63WC, GB4SCR IO82KW, GW3ZTH/p IO81FP, G4ATH/p IO84VB, GI0LIX/p IO74BU, GI8FQB/p IO64XC, GW0PZT IO72PT, G3ZTT/p IO83PF, G3JDT IO83QI, G3ZME/p IO82NN, GD8EXI IO74PC, OE3XUA JN77XX, G4CBW IO94HH, GI4GTY/p IO74AI, GW4VEQ IO73SG, EI3GE/p IO63XD, G8ESB IO94HH, GM4DMA/p IO87XO, GM4JJJ IO86GB, S57C JN76OM, S53DNA JN76BL. tnx fr info

***DF0RI, (Op DL8OBQ) JO42NC wkd 700km Sept 3rd/4th:*** GJ4ZUK/P IN89WF 853, OK2TT/P JN88IA 706, S50C JN76JG 767, OK2KMT JN88TU 701, 9A1CBE JN86BE 831, G4ERG/P IO94PH 698, S52KD JN76EK 735, F1EAC/P IN99EH 817, OK2KIS/P JN99CL 701, OM3B JN98TW 820, OM3KEE JN88UU 706, HG7B/P JN97KW 835, OM5Z JN98BI 763, SP3NNH JO81WJ 607, G3LRS/P IO92IO 709km. tnx fr info, Uli

***DG0CAI, JO52JX wkd:*** 3.9.94 F6HPP/p JN19PG 700km. tnx fr info

***DG1VL, JO61WC wkd 900km:*** 29.9.94 G4WKN/P IO92QP. 12.10.94 GW4FRX IO82MR, G3KEQ JO01BH, G7ANV IO95CH, G4LXU IO94DB, GM8FXX IO87WB, G4EKM IO94GU. tnx fr info, Henry

***DH0LS/p, JO61JF wkd:*** (140 Watt, 9el-Yagi) 09.07.94 LA7VIA JO59fx 984km, LA2AB JO59fv 975km, SM6RTM JO78rj 815km, LA8SJ JO59hq 950km. JO50SV: 16.07.94 1932 TK/DC3VW/p JN42MM 950km. 22.09.94: G4RKV JO01OE (from JO50sv) 24.09.94: (from JO61jf) SP5WCK KO12cj, SM1NVM JO96bw, SP4SKA KO14lc, UA2FY KO04fs, UA2FL KO04fq, YL3AG KO26av (599+30dB) SP8NCJ KO12na, es mni stn aus KO01/02/JO94 29.09.94 G6ARF IO92qp 858km, GW4ZQV IO81lq 1016km, G4UDE IO82kt 1028km, G4YTL IO92mb 874km, G8NOF IO92ci 933km, EI6GF IO62rg 1256km (55/55), GW4FRX IO82mr 1016km (59/59 20Watt), G7JBG IO92vx 837km, G1BFK IO93ib 910km, G3RHH IO82ub 965km. 11.10.94 G8ECI JO03ak 833km. 12.10.94 G4CLA IO92lj 883km, G4UJS IO82pv 1001km, G4ZWP IO82sq 982km, G4ASR IO81mx 1011km, GW4UWR IO81lp 1016km, G7ANV IO95ch 1014km, G4KUX IO94bp 992km, GM0BQM IO85ce 1128km. 13.10.94 G4WOX IO95ee 1000km, G4LXU IO94db 962km, G1POK IO91vi 821km, LA4YGA JO48jm 866km, OZ9EVA JO57gr 763km, GX4NOX IO93fr 942km (59+25dB), SK6HD JO68sd 816km, LA9DM JO59lf 928km, LA3TL JO58sx 899km, G0TRN IO93fh 932km, SM6GVV JO58wa 793km, LA3BO JO59cd 921km. 15.10.94 (JO61jf): I4XCC JN63gv 816km (59/59), G3KEQ JO01bh 880km, G4ASR IO81mx 1089km, GW4FRX IO82mr 1089km, G6HKM JO01ft 855km, G1AWF IO91un 907km. tnx fr info, Jens

***DH0LS/p, jo61jf wkd Sept 3rd/4th:*** G0RDI/p JO01KJ 828, G0KPW JO02PA 798, G7SEU/p JO01PU 798, F5KCR/P JN26IX 754, F1ERG/p JN27JJ 719, F6HPP/p JN19PG 709, OZ6ABA JO57DJ 705, OT4F JO11ME 679, RW2R KO04FT 649, F5OAU/p JN27UR 643km. tnx fr info, Jens.

***DH3IAJ, JN48, wkd:*** 11.10.94 G1EUC JO01GR, PA3EKZ JO23MH, G4RKV JO01OI, DG5LBA JO43UN. tnx fr info, Ralf

***DH6JT, JO31jo / DL34b wkd Oct 12th/13th:*** G3KEQ JO01BH, G1YFA/P IO92LJ 545, F6HHR JO10AH, G3BOC IO82LT 683, G7PSB JO01FJ, G4ASR IO81MX 671, G6DZR IO92NE 530, GW4FRX IO82MR 676, G8ECI JO03AK 500, GW4ZQV IO81LQ 678, GX6WWR/P IO91OF 527, G8HUY IO90MW 544, G8POC IO91HQ 563, G6JJP IO82SG 638, G6ZQM IO92JT 561, G3FDW IO84ME 714, G0LRS IO91UI, G1HXH IO95OE 641, G3JYP IO84SN 699, G4UGV JO01UH, G7IGC IO92BM 601, G3YVR IO91WD, G7RAU IO90HQ 578, G0UQY IO90UV, G6MXL IO80XR 623, G3NSY IO82NP 669, G1AWF IO91UN, G6IYK IO91WM, G4IRQ IO92PB 518, G7TCJ IO90OT 535, G3CU IO91GO 569, G0ADH IO91KO 546, G0EOY IO94DX 678, GD7HEJ IO74SD 805, GW6NLP IO83KB 692, GD6NDE IO74RD 810, G1SWH IO83QO 673, G7NER IO83QP 673, G3NBQ IO83MW 705, G7PAZ IO92KX 559, G7JJC IO93AH 577, G6FQZ IO91JR 552, G7MOR IO93GH 590, G4GWM IO92GB 569, G8LIH IO93GH 590, GW7JML IO83LB 687, G7SMJ IO92IV 568, G7PHC IO94LA 591, G1DFN IO94DO 658, G4RVR IO93GG 589, G4HEV IO93KX 594, G3JYS IO92FJ 577, G7HIA IO92IO 563, GW0EMB IO83MB 681, EI3GE IO63XD 887, GW3KJW IO72PT 794, G6MGB IO92BQ 603, G7RVM IO82UD 626, GI4EIZ IO74AP 914ODX, G0ZSS IO93IB 572, G0OWU IO82WM 679, GB3LER/B 599 IP90, G8IBO IO91LL 542, G1IDZ IO91PG 521, GM0BQM IO85BE 811, G1EUV IO91WP, G0TAR JO01GV, G3MZU IO92BI 599, G7JRC IO93FN 603, G1LMZ IO95FE 681, G7BXA IO93VT 532, G7EXX

IO81VQ 621, G8XVJ IO83RJ 662, G0KBE IO93JE 570, G1RST IO95BF 701, GW4UWR IO81LP 678, G8ACR IO92BJ 599, GW8JLY/P IO81LS 678, GW6RBZ IO81LP 678, G6ZWP IO82SQ 642, G1GFQ IO83PH 671, G8XVJ IO83RJ 662, G3KIP JO01CE, G3PGC IO95GA 666 2w, G8FBG IO91SG 504, G8SGP IO94RK 583, G4ZCN IO94JP 632, G6ZIC IO94FV 664, GM1TDU IO87WE 847, G8MYK IO92BJ 599, G0VDM JO01DO, G7IGC IO92BM 601, G1OAP IO82RT 650, G0TRN IO93FH 595, GW4RAF IO83MF 685, GW1PJP IO81JQ 689, G1FYN IO95EF 688, G8AIM IO92FG 576, G7CWM IO92WU, G7JCX IO92GW 580, G4EKM IO94KQ 629, G7GJI IO92DT 594, GW7JML IO83LB 687, G0FQB IO93GG 589, G0VAD IO95FE 681, G3NAP IO92FJ 572, G3EDD JO02DE, G0VAH IO83NB 676, G6OCE IO93UT 536, G1YLH IO93JK 578, G8JJR IO93KL 574, G4EKM IO94GU 657, G1EFL JO01FS, G1JDP IO94FU 662, G8UCN IO93FL 601, G7LNO IO94FK 669, G6HFW IO83SM 660, G4AVO IO95EE 685, G7LRQ IO91TQ. SQRS wkd: JO00, 01, 02, 03, IO90, 91, 92, 93, 94, 95, IO80, 81, 82, 83, 84, 85, 87, IO72, 74, IO63. tnx fr info, Thorsten.

*DJ2XS, JO53AK, wkd 2m:* 29.7.94 1900 ES5WE/0 KO07XX. 31.7.94 2025 ES8JX KO28LM, 2055 YL3AG KO36, 2118 ES3BM KO29JA. 23.9.94 1955 G7LIL IO92HR. 24.9.94 0525 G1HEW IO93JI, 1517 OK2BLE JN99FN, 1600 OK2SBL JN99HQ. 12.10.94 1725 GW4FRX IO82MR, 1818 G3JHM IO91LC, 1930 G4ASR IO81MX, 2010 G3PGC IO95GA, 2200 G3LEN IO91VG, 2320 GM0BQM IO85CE, 2325 G4KUX IO94BP, 2353 G4WOX IO95EE. 13.10.94 1920 G7ANV IO95CH, 1930 G6ZWP IO92SQ, 1938 G7LIL IO92HR, 1950 G0CYB IO93JD, 1955 G1FYN IO95EF, 2030 G3PGC IO95GA, 2105 GX4NOK IO93FR. 14.10.94 0610 SP7OGP KO01AM, 0620 SP9SOI JO90MG, 0624 OK2BTI JN99FU, 1100 SP8QGT KO11PI, 1153 SP9UMK KN09IO, 1254 SP9GVT JO90LH, 1312 SP9TTS JO90KG, 1321 SP9SNG JO90OI, 1331 US5WU KO20DI, 1351 SP5VIQ KO02IK. RIG 11El-F9FT + 500W. tnx fr info, Matthias

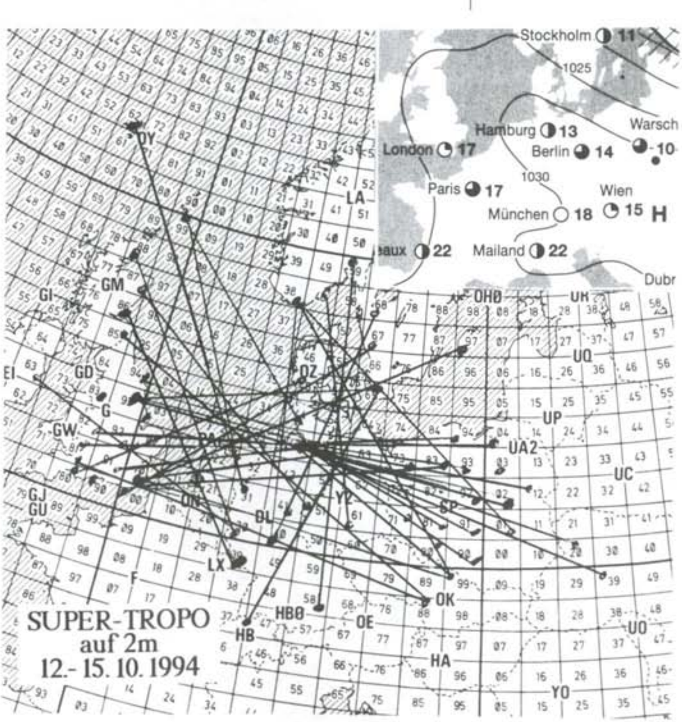
*DJ8ES, JO43 wkd:* 03.09.94 F5OAU/p JN27UR 744km. 14.10.94 SP7NJX JO91RR 710km. tnx fr info, Wolfgang

*DK0ALK, JN48AB, 75W, 2x7el, wkd Sept 3rd/4th:* G4RKV JO01OI 612, S53M JN86BS 624, OL6R JN89DN 626, G0RDI/P JO01KJ 634, G6SRC/P JO01JG 631, OK2KGU JN89IG 650, G0KPW JO02PA 652, G4PIQ JO01MU 654, OK1OEA JO80FG 659, G7YBI JO02PD 661, OM3KMY JN88MK 667, OK1FMJ JO80IB 669, G4RRA IO91OF 726, OK2KFM JN99FN 780km. hrd: G8TIC, HG6Z tnx fr info, Michael

*DK0OG, JN68GI wkd 700 km Sept 3rd/4th:* YO6KBM/p KN16IK 794, PE1EWP JO11WH 703, PA0GHB JO11WH 703, OZ1HLB/p JO55US 827, F6DKJ/p JN14QX 793, Pa3BZZ/p JO21BX 722, G4PIQ JO01MU 907, G0KPW JO02PA 897, DL0HU JO44OJ 710, TM5C JO10BD 781, DL0LJ/p JO33GU 741, YO5TE/P KN07XB 719, YT0T KN04IT 737, G4RKV JO01OI 877, OZ5UKW/p JO55QJ 787, PA3BLS JO22NT 720, DF0OE/p JO44QS 746km. tnx fr info, Georg

*DK0PX (Op DH3IAJ), JN48JC, wkd:* 23.09.94 G4RKV JO01OI. 30.09.94 G3KEQ JO01BH, G8HGN JO01FO, G3BNE JO01BJ, G8MYK IO92BJ, G8NOF IO92CI, G3RHH IO82UB, G4RHR JO02PA, HA/DL1MAJ JN87PU, OK1FLP JO70KK. tnx fr info, Ralf

*DK1VI, JN49HH, EJ54f, wkd:* 110594 IW5BML jn53pb 707. 220594 G4DSD/p jo03ce 728. 160794 EA3FLN jn11nv 927.




**Super Tropo at 12-15th of October, 1994**

070894 IW6BLH jn63ro 732km. Stn: IC251E, GaAs-Fet Preamp, PA 4CX350B, 16 El. F9FT tnx fr info, Ernst

***DK8LV, JO44? wkd 700km:*** 11.7.94 F5ADT IN94 1291km. F1FPL/P IN99 915, F2LQ/P IN88 1064, F6CKZ JN09 815, G0BLB IO81 875, G0CUZ IO82 797, G0EMG IO94 734, G0GAG IO93 717, G0OFE IO90 870, G1BFK IO93 725, G3CKR/P IO93 765, G3KEQ JO01 717, G4LCQ/P IO92 760, G7RAU IO90 843, G8LNC/P IO90 838, GM4RWE IO86 812, GU3EJL IN89 953, GW4UDE/P IO82 863, tnx fr info, Stephan

***DL0LN/P, (Op DH3YAK) JO31PW, 150m asl wkd Sept 3rd/4th 700km:*** IK2CFR/3 JN56WK, OE3XUA JN77XX, OE1XTU/3 JN77KR, GU0EMG/p IN89VR. RIG: FT225RD, 200 W, GaAs-Fet, 14 ele Yagi. tnx for info, Winfried

***DL0UL/p, JN48UO, 800m asl, wkd Sept 3rd/4th:*** G8MNY/P 91, OZ5QF 45, OZ6OL 65, G7SEU/P 01, OZ5UKW/P 55, G7PBI 02, G8TIC/P 02, OM3KDX/P 19 923km, OM3B 98, G0KPW 02, G6RAF 92, OZ1STK 45, DK0OH/P 64, HG6Z 97, G4PIQ 01, HA6KVD/P 97, G1TWS 01. Rig: 500w + 4 x 17 Ele. tnx fr info, Harald

***DL0UMK/p (Op DF2NU), JN57VT, wkd 700km on Sept 3rd/4th:*** DL0HU/p Jo44OJ 755, PA0FHG JO22IO 734, PA3BLS Jo22NT 730, PI4GN JO33KK 716, PA3EQK JO22HG 713, DB8WJ Jo33JH 703, DD0BI JO33RL 701, DL9GJW JO54VC 700km. tnx fr info, Rainer

***DL1KDA, JO30FQ, wkd 700km:*** 06.09.94 SM7ALC JO65RL 708. 23.09.94 G0PWE IO95FE 733, GM0BQM IO85CE 849. 29.09.94 HA/DL1MAJ JN87PU 846. 04.10.94 OZ4TST JO75KD 750, OZ4EDR/A JO75JE 749. 11.10.94 OK2UCM JN99FN 864. 12.10.94 G3BRA IO85XS 799, GI8FLQ IO74DO 928, GI4SAM IO74CN 931, GD7HEJ IO74SD 833, GW4VBM IO83LF 709, G7PED IO83MK 712, GW6NLP IO83KB 708, EI6ARB/P IO63VF 911, EI3GE IO63XD 899, GW7JML IO83LB 703, SP1DDT JO73TP 706, SP3SFN JO82TM 797, SP2NJI JO92MP 893, OZ3GW JO56BR 714, GM1TDU IO87WE 914, GM0TQK IO85LU 853, G1IWM IO94FW 715. 13.10.94 GM8LFB IO88JH 1051, G8FGK IO94GX 714, G1HXH IO95FE 733, GW0CKX/M IO81FP 705, G3PGC IO95GA 717, GM7LVJ IO85JV 864, GM8LFB IO88JH 1051, G4SJP IO70UX 755, GW3ZTH/P IO81FP 705, GD3TNS IO74SE 835, SM7URN/7 JO76KF 830, SK6HD JO68SD 946, SM6RIG JO67BN 848, GW7JML IO83LB 703, SP3EPX JO83ID 753, SM7JPI JO75DW 781, SM7UYJ JO65OQ 714. 16.10.94 OK2PJW/P JN89JM 748, OK1UDD/P JO80FE 710, OK2KJT JN99AJ 839. tnx fr info, Alex

***DL2FDX, JO40LG wkd:*** 30.09.94 OK2BLE JN99FN 684km. 25.09.94 IW1BZJ/6 JN63GN 794km. 11.09.94 I4XCC JN63GV 759km. RIG: 18ele DJ9BV 10m + PA 200W + TS-790E tnx fr info, Oliver

***DL3YEE, JO42, wkd:*** 21.7.94 SM/DG0KK/P JO96BW. 23.9.94 G4UDE IO82KT, G1BFK IO93IB. tnx fr info, Klaus

***DL6AM/P, JO51FR (Sonnenberg i.Harz 850m ü.N.N), Rig: 180W + 9 Ele, 700Ah solarpowered, wkd 700km:*** 3.9.94 FA1JZH/P JN25VV 731km. 4.9.94 I4XCC JN63DV 878km. tnx fr info, Ronald

***DL8BDU, JO43AA wkd 700km:*** 22.05.94 GW0RDI/P IO82JJ 760, G4CIR IO81WR 704. 03.07.94 GM4ZUK/P IO86RW 802, G4JBH/P IO80IV 810, G4RFR/P IO80WP 746, HB9MM/P JN36FS 704, GW3WGV/P IO81HV 782. 08.07.94 LA8SJ JO59HQ 758. 24.07.94 GM8LFB IO88JH 916. 06.08.94 F5KCR/P JN26IX 712. 07.08.94 F5FNY/P JN36BP 722, OE1XTU/3 JN77KR 761. 03.09.94 GU0EMG/P IN89VR 799. FA1JZH/P JN25VV 808. 04.09.94 IK2CFR JN56WK 781, HB9S JN36DO 724km. Rig: FT221R, PA 350W, 2X15 Element, VV DJ9BV, 23m über Grund tnx fr info, Klaus

***DL8EBW, DL66a, JO31NF wkd:*** 13.08.94 I2FAK JN45ob. 03.09.94 OK1FJH/p JN79io, OK1UMA/p JN79io. 23.09.94 G4KUX IO94bo. 24.09.94 G8ECI JO03ak. 25.09.94 DG0KK/p JO74. 29.09.94 G4UDE IO82kt, EI6GF IO62, G4ASR IO81mx. 30.09.94 OK2PVF/p JN99cl, OK2BLE JN99fn, OK2ZZ/p JN70ur. 04.10.94 OZ7AFG/A JO45vx. 11.10.94 DJ7AW JN68af. 12.10.94 GX6WWR/p IO91of, G0CUZ IO82wm, GU3EJL IN89vr, GW4ZQV IO81lq, GW7SMV IO81ln, SP1MVG JO73fu, GW6NLP IO83kb, SP3SFN JO82tm, (as well a lot of Gs from IO90-93, 81-83, JO01, 02). 13.10.94 G1HXH IO95fe, SM7UYJ JO65oq, SM7RYO JO76db, GX4NOK IO93fr, G4SIK IO70jf, SM6RIG JO67bn, SK6HD JO68sd, SP3EPX JO83id, (as well a lot of F, G, and OZs). 15.10.94 GW3ZTH/p IO81fp. 16.10.94 OK1VMS JO70gu. Rig: 350w + 11 Ele. tnx fr info, Guido

***DL8HCZ, JO53AP wkd:*** 14.10.94 SP1, 2, 3, 4, 5, 6, 7, 9 + OK2. Most squares in SP were qrv. US5WU KO20 wkd, UR5TW KN39 hrd.

***F6HPP/P, JN19PG wkd Sept 3rd/4th:*** EA1BFZ/P IN81 925, EI3GE IO63 778, OZ1UKW/P JO55 873, EA2AD IN92 811, GD8EXI IO74 768, EA3DJL/P JN12 760, DL0IL/P JO61 721, F6KBR/P JN12 755, DL0WSW/P JO60 761, OK1KYT JO60 760, OZ1UKW/P JO55 873, DL0EO JO44 723, DG6QF/P JO61 727 , OE5XKO/5 JN68 774, OK1KZE/P JN69 725, OL7Q/P JO60 741, OK1KNG/P JN69 759, DL9GJW/P JO54 794, DG1RVM/P JO62 762, GD4IOM IO74 767, OZ1STK JO45 864, DG5OPK/P JO54 758, DL4DWA JO61 750, OZ5ZF JO45 780, OK1KKD/P JO60 713, F1CSU IN93 710, EA1RCM/P IN73 910km. tnx fr info, Laury

***F6KGT/p, (Op F1NQP), JN19DG, wkd 700km on Sept 3rd/4th:*** EA2AZW IN83OA 797, F5DYD/P JN02QW 707, GD4IOM IO74QD 721, EA2LU/P IN93IA 747, F1SOH/P IN93LD 727, F6KEH/P JN02XR 727km. tnx fr info

***F6KPQ/P, (Op F6ETI) IN87KW, wkd Sept 3rd/4th 700km:*** FA1JZH/P JN25VV 715, F5FNY/P JN36BP 713, G4ERG/P IO94PH 729, F1BLL JN23LL 800, F1IKD/P JN24QA 788, DK8SG JN48GT 867, FA1PHB JN39DB 705km. tnx fr info, Philippe

***G4PIQ, JO01MU, wkd 700km on Sept 3rd/4th:*** EA2LU/P IN93IA 997, DK0OG JN68GI 905, DF0YY JO62GD 786, OZ5UKW JO55QJ 785, DL0GBW/P JO53WH 748,

**LZ1ZX, LZ1KQ, LZ2CI, LZ1DP during IARU VHF Contest**

DL2NBU JN59KQ 731, DB0DC JN59KV 722, F1HSU/P JN15BK 717, HB9ADJ/P JN36LQ 716, DL0UL/P JN48UO 713km. Rig: 400W and 4 x 15el at 17m + 2 x 19el at 21m. tnx fr info, Andy

*G7SEU/p, (OP G4VIX) JO01OU wkd Sept 3rd/4th 700km:* DF0GE/P JO50NF 710, DG0OFH/P JO50SP 725, DG7DCU JN59JF 731, DL0MA JN47QT 732, DC6NY JN59KE 738, DL0ME JO50WP 748, DG6NEL/P JN59NF 753, TM8P JN25GJ 756, DL0PL/P JO50XL 758, DF0YY JO62GD 770, OZ5UKW/P JO55QJ 771, HB9FGL/P JN46LW 778, TP5M JN14QX 779, F6DKJ/P JN14QX 779, OK1XFJ/P JO60CF 783, F6KNB/P IN94UU 787, F5TCA/P JN35BL 792, DH0LS/P JO61JF 797, OK1KWD/P JN69GT 821, F5JGY/P JN04PJ 829, OK1KKD/P JO60NF 845, OK1KYY JN69JJ 854, F5MLA/P IN94VF 855, DL1VAG JO61VC 868, DL0WSW/P JO60US 870, OK1KLI/P JO70DR 911, OK1IAS/P JN69WR 914, IK2CFR/3 JN56WK 975, EA2LU/P IN93IA 1001, OK6DX JO80EH 1065, OE1XTU/3 JN77KR 1075km. Rig: 400w, 2 x 15 ele / 14m + 2 x 14 ele / 8m. OPS: G1OGY, G4EZP, G4FUF, G4VIX, G4ZTR, G6CMS, G6PZT, G7SEU. tnx fr info, Dave

*I4XCC, JN63GV wkd:* 03.07.94 F6KSL/P JN28QJ, OM3KDX/P KN19DB, YO2IU/P KN06ID, YO2II/P KN06UG. 10.07.94 IW9DCN/9 JM77IW. 14.07.94 DL9YEY JO41GV, DK9OY JO52CK, DL0VW JO52IJ. 24.07.94 OM9AEM KN08AJ, SP6AZT JO81NG, DL0WAE JO42FB, DL6UAL JO61XU. 02.08.94 SV8CS KM07KS. 03.08.94 SV8CS KM07KS. 05.08.94 IW9CYW JM78OD. 06.08.94 EA3RCF/P JN12ED, EA3BTD/P JN12GA, F6KBI/P JN15VP. 07.08.94 SP3KEY JO71UT, DK9OY JO52CK, DK6JU JO31LC, HG7B/0 KN18GD, DL0WAE JO42FB, DL9USA JO71EN, SP3RBR JO71UT. 13.08.94 F8CS JN27MI. 14.08.94 YO6KBM/P KN16IK. 24.08.94 SP7FBP KO00DP. 26.08.94 SP9BPP JO90BP. 27.08.94 SP9QMP JO90FB. 04.09.94 YO5TE/P KN07XB, DL0WAE JO42FB 957, DL9YEY JO41GV 937, DF0YY JO62GD 917, SP9KDA/9 JO90JU 904Km. 11.09.94 DL0MQ JO41GV, DL8CMM JO52WO. tnx fr info, Claudio

*I4YNO, JN54KP wkd:* 05.03.94 DL3ARM/p JO50VQ. 06.03.94 OK1OEA JO80FQ. 14.05.94 DL8AKI/p JO51CH. 22.05.94 EA6VQ JM19MP. 29.05.94 DL4FCS JO40HG. 02.07.94 DF0FA/p JO70JT, EA6VQ JM19MP, EB5IFI IM99WU, EB5MS IM99RK. 03.07.94 OM7M/p JN98HP, X5IZB JN84US, F6KSL JN28QJ, OK1KHA JO80CI, OK2KRT/p JN99DJ. 24.07.94 DL4FCS JO40HG. 26.07.94 EB5IFI IM99WU. 07.08.94 EA6/HB9FAP/p JN10WA + Good condx to IT9. 10.08.94 hrd ON4QQ in JO20 during an MS sked. 13.08.94 F1CYB JN17XT, F1UO JN16VB. tnx fr info, Alex

*IK5FTQ (FD05c) wkd 700km:* 04.07.94 EA5JE ZZ49h. 14.07.94 EA3CHN BB42f, EB5MS ZZ48g, EA3AND BB42g. 17.07.94 EA3BHR BB41j. 29.07.94 EA5YB ZZ79c, EA6YY BZ34e.

*IK5FTQ/5, FE75c, 1300m asl wkd:* 31.07.94 IT9JOF/IH9 GW11g, IW8PPJ HY69h. 06.08.94 EB5JNA/p ZY29c, EB3DYS BB42g, EA6SA/p BZ17d, EA3BTD/p BC73d, EB5HRX/p AY21a, EA3RCF/p BC62d, EA3CSX BB41j, EA6IB AZ78j, EB6YY BZ34e, EA5YB ZZ79c, EA3DXU BB32f, EA5IC ZY09b, EA5GDR ZZ56g, EB5IFI ZZ20a, EA5GIN/p ZY29d, EB5MS ZZ48g, EA3CHN BB42f.

IK5FTQ/5, FE64d, 1800m asl wkd: 19.06.94 EA3AND BB42g, EB3ENW BB41j, EA3CEU BB23f, EB5MS ZZ48g, EA5ABE ZZ49g, EA6IF CA71e. 17.07.94 EA3CN BB51a, EA6SA/p BZ17d, IW9DRW GX05b, EA5ABE/p ZZ74g, EA3FLX AB69a, IT9AAI GX05b. tnx fr info, Bob.

*IW1BCV, JN44FS wkd 700km:* 31.03.94 IT9IPQ/9 JM78SG. 17.04.94 OK1KKD JO70AD. 07.05.94 DF0OL/P JO41GD, IW9BCW/9 JM77KX, DL0JVK/P JO60AO. 08.05.94 OK1KJB/P JN79IO. 12.05.94 DG1RNH/P JO60LK. 14.05.94 DL8AKI/P JO51CH. 15.05.94

OK1KLX/P JO80BJ. 16.05.94 IW9DRW JM67LX. 17.05.94 IT9NDW JM68OD. 22.05.94 EA6VQ JM19MP, OK1FTA/P JN79IO, OK1XFJ/P JN79IO, OK1UMA/P JN79IO. 29.05.94 I8MIB JM88AQ. 01.06.94 ON4GG JO20AR. 04.06.94 IW8PPJ JM78TF. 12.06.94 HG8UG JN97SA. 18.06.94 IW9BDV/9 JM77KX, IT9AAI JM67LX. 25.06.94 IT9QPF JM67LX. 01.07.94 OK1UOZ/P JN79US. 02.07.94 OK1FNX/P JN79IO, OK1KKI/P JN79NF. 03.07.94 OK1KCR/P JN79VS, OK2KLI/P JN89DN, DL3ARM/P JO50VQ, HA2KSD JN87VE, OK1KKA/P JN79PA. 07.07.94 OK1FWG/P JN79US. 15.07.94 IT9VDQ/9 JM68JB. 17.07.94 OK1IAS/P JO60JJ, OK1XFJ/P JO60JJ, DG0OBA/P JO50SU, DH0LS/P JO50SU, DL1ATO/P JO50SU, DL1AUW/P JO51CH, OK1KPU/P JO60VR. 28.07.94 IT9AUP JM67LX, EA5YB IM99VB. 29.07.94 IT9WGZ/9 JM68GB. 30.07.94 EA3CCK/6 JM19MP, IT9JOF/IH9 JM66AT. 31.07.94 IT9TVF JM68OD. 07.08.94 IT9BLB/9 JM68KB. 08.08.94 IT9GNG JM67FT. 14.08.94 I3EME/IT9 JM68MA. 20.08.94 OK1JKT/P JO60OK, IT9VXS JM67GN. 21.08.94 IT9XUC/P JM68ND, IT9MBZ/9 JM67LX, IW9CER JM78QF, IK1SPR/9 JM77AX, IT9SGO JM68GN, IT9AAI/P JM77DT, IW9EFN/9 JM78SF, ID9TDN JM78KO. 22.08.94 IW9DAA/9 JM68MC. 24.08.94 IT9IEF JM78SB. 03.09.94 DL0RCW JO60EP. 04.09.94 OL7Q/P JO60RN, OK2KGU JN89IG. 11.09.94 DL9YEY JO41GV. 23.09.94 OK1VDJ/P JN79US, OK1KPA JN79US. 25.09.94 DL3SBA/P JO31PD. 29.09.94 OM3CQF/P JN88RT. 15.10.94 OK1FEA/P JO80FG, OK1UOW/P JO80FG. 16.10.94 OK2PJW/P JN89JM. tnx for info, Carlo

***IW9CER, JM78QF wkd:*** 15.5.94 TK/F1MOZ 41, TK1DX 42. 16.5.94 TK5HC 42. 17.5.94 TK1FC 42. 31.5.94 EA5IC 98. 19.6.94 TK/IK1AZV 42, IP1/IW1QNR 44, TK/IK2QIN 42, I1ZHH/1 35, EA6QB 08, EA6AAX 08, EA5DYB 98. 25.6.94 F1BAV 33. 1.7.94 EA6QB 08. 2.7.94 EA6AAX 08, 9A1HST 75. 3.7.94 S50C 76. 5.7.94 TK/DC3VW/P 42, EA6QB 08, EA6AAX 08, EB5JVS 98. 6.7.94 IK1TVR 34, TK/HB9MMM/P 42. 18.7.94 EA5FKW 98, EA5IC 98, EA5GRB 98, EA5DGC 97. 7.8.94 F/I1XOI 34, TK/IK2PFL 42, TK/F5AOL 42, EA6IB/P 09, EB5JNA/P 98, EA5ELX/P 98, EA5GIN/P 98, EA5/F5TDK/P 98, EB5AHY/P 08, EA5IC 98, EB5HRX/P 08, I1AXE 34, EA5YB 99, EA6SA/P 19, IK1PLD/1 34, EA5GRB 98, IW2CED/1 44, EA5ADC 98, IW3BCL/1 33. 9.8.94 EB5JNA 08, EB5JVS 98. 14.8.94 IK1FHB/1 34, I1DDS 35, TM5LCN 33, I2FHW 44. 15.8.94 IW1AZJ 35, IW1BCV 44, IW1BCW/8 JM79QX. 21.8.94 IK1TBE/1 34, IK1UWQ/4 54, IW1BCV 44, EA5IC 98, EA6QB 08, EA5GIW 08, I4XCC 63. 31.8.94 I2ZFJ/1 44. 4.9.94 SV1BRT/8 KM08HQ. 6.9.94 EA5FKW 98. tnx fr info, Tony

***LA8AK, DS80b, JO38 wkd:*** 13.10.94 F6FEO AJ, DJ7RF FN, DK7AW/p FL. 14.10.94 SP1MVG/p HN, SP6CMZ IM, SP1DPA HN, OK2BVF/p JJ, OK2PVF/p JJ, SP7VCK JL, SP6RLF IL, SP6CRZ IL, OK1KPU GK, SP7VCD JL, OK1AUN GK, SP7RFE KL, SP9DHQ JJ, SP6HEQ IL, SP7LHU IL, SP5IDK KM, SP2IQW JO. tnx fr info

***LZ1KWT, KN32FR, 1000m asl, wkd 700km:*** 11.8.94 S50C JN76. 13.8.94 HA3UU JN96, HA7UL 97, HA4YD/7 97, HA5PT 97, HA0MK 08, S50C JN76JG 1004, HA7WJ 97, I4XCC JN63GN 1111KM. 15.8.94 SP9PRO/7 KO10. 3.9.94 IN8QAT JM89, IK7UXY 90, YZ7NOV 77, HA5KDQ 97, HG7B/P 97, S51A 75, IK2CFR/3 56 1224KM, F8KAW/P JN17RO 1875KM !!!!!, I1MXI/1 JN44SN 1374KM, hrd: EA3DJL JN12IK 1996km!, 9A4EW 95, IK4PIG 45, HG6Z 97, S53CDM 75, HA2RG 86, HA2KSD 87, 9A3GL 95, S51ZO 86, S51WV 76, S53M 86, S50C 76, HA9KRL/P 97, HA3MQ 95. 4.9.94 9A7D 95, HG7KLF 97, HG1W 87, HA5BDJ/2 87, OM3CTR/P 89, 9A1CCD 85, 9A1CB 86, S58A 86, 9A2SB 95. Rig: 1kw, 2 x 16 ele. tnx fr info, Christo

***OE1XTU/3, (Op OE1MCU) JN77KR, 2 x 11 ele, 1kw, wkd Sept 3rd/4th 700km:*** DL1IMH JO53KM 703, DL1QH JO31NP 707, DL0VX JO32VG 714, DK0MU JO31QX 715, DL0LN/P JO31PW 717, DF0RW/P JO31GG 719, DF0FJ JO42FS 722, F/DK0GR JN29PD 724, DB0OVV JO31HO 733, DL9GJW JO54VC 741, DG0LB/P JN61ND 745, DK0XT/P JO31EO 748, SP4CHY KO03GS 781, PA3FJY/P JO32EG 789, PA3BAS JO21RL 796, PA2CHR JO22XA 797, PA0JED/P JO22WA 801, PA0JMV JO21PM 808, OS4FI/A JO20GT 823, OT4O JO20EP 828, OT4A JO21HC 830, PA0RDY JO22KJ 881, PA3BLS JO22NT 893, PA0AWN JN21XW 952km. tnx fr info, Michael

***OE3XUA, JN77XX, HH10b, 1050masl, wkd:*** 2.7.94 DK0OF JO33, PA2CHR JO22, DJ0PQ JO31. tnx fr info, Johannes

***OZ1DOQ/p, JO64GX, wkd Oct 4th 700km:*** DC4VO JN39JH 742, ON4KST JO20EP 730, G4SWX JO02PB 810, DL2IAN JN49BC 719. Rig: 4CX250 + 2*15el CUE DEE, 144m ASL tnx fr info, Uffe

***PA3BIY, CM72c wkd:*** 940613 SK6HD GS68d, SM6KJX GR47g, SM6MPA GR11g. 940627 SM7UYS GP36j, EI3GE WN63f, EI5FK VL18h, EI4DQ VL40j. 940703 F2EE BE07b, EI2WW/P WN80a. 940729 YL2GDA KQ36f. 940730 ES5WE/0 KR10b. tnx fr info, Peter

***TK/HB9MMM/p, JN42MM wkd 700km:*** 4.7.94 EA3GDP 00, EB5IFI 99, EA5DVI 98, EA5IC 98. 12.7.94 EA5DIT 99, EA5CD 98, EB5IJA IM88WV 1024km. From JN42RU: 14.7.94 9H1CD 75, 9H1GB 75. 15.7.94 IW9CTU 78. 16.7.94 IT9IPQ/P 78, IW9EFN 78, IW0CUT/8 78, IW0CXA/8 78. tnx fr info, Püüp

***YO5TE/p, KN07XB wkd Sept 3rd/4th:*** IK2CFR/3, JN56WK, 770, I4XCC, JN63GV, 813, DG0OG, JN68GI, DL0WSW/P, JO60US, RIG:10 EL DJ9BV,200 W,MGF1302. tnx fr info, Nelu

## 70cm > 500km

***DD0VF, JO61VB wkd:*** 29.9.94 G6RAF 92 HRD. 2.10.94 PA3BPC/P 21, IK4DCX 64. 13.10.94 G8BAV 82, GB3SUT 92 539, GB3BSL 81 579. tnx fr info, Steffen

***DD7LF, JO54 wkd Oct 1st/2nd:*** DL0DR JN48FX 592, DF1IAZ.P JN49RB 572, DK8VR.P JN39NR 539, OK5VHF.P JO70UR 535, HB9SUL.P JN47PN 739km. Rig: 35 w, 2 * 21 ele. tnx fr info, Franz.

***DF0DA/p in JO30JF wkd on 432 MHz via Tropo (600 km):*** 020794: G0FRR/p IO80WP, G0JRB/p IO94SB, F6KBO/p IN88IN, G8XVJ/p IO93AD, G7AIC/p IO80LV, G4BRA/p IO80ST, G4CLA/p JO03BF, G4TVR/p IO92BJ, G7SAC/p IO93AC. 030794: G1KHX/p IO81PH, G4BHG/p IO93RA, G0GGG IO81VE, G6ZME/p IO82NN, G3LRS/p IO92MO, G8OHM/p IO82XJ, G4ZHG/p IO93RA, G6APZ/p IO94WC, G4BRK/p IO91DP. tnx fr info

***DG1VL, JO61WC, wkd 1000km:*** 12.10.94 G4UDE IO82KT 1177, G3NAQ IO91HL 1059, G8PNN/P IO85XE 1150, G3KPV IO91LK 1036 km. 13.10.94 G1RST IO95EF 1127, G6URX IO94EX 1118 km. tnx fr info, Henry (Ed.: REAL DX! FB!)

***DJ1OJ, JN58SE wkd Oct 1st/2nd:*** PA6C JO33GB 646, OK2KDJ/P JN99BM 504, OM3 JN98LR 550, OL7Q/P JN99FN 528, DL0HU/P JO44OJ 709, PA0PLY JO22MH 651, 9A3B JN95FQ 594, 9A2SB JN95GM 609, PI4GN JO33KK 669, DL6BCR/P JO43RE 575km. Rig: 10W, 2 x 16 ele. tnx fr info, Heijo

***DJ2XS, JO53AK wkd 70cm:*** 21.7.94 2025 SM/DG0KK/p JO96BW. 31.7.94 1950 SP2DDV JO93AC, 2210 ES5WE/0 KO07XX. 24.9.94 1605 SP6MLK/p JO80JG. 12.10.94 2115 G3CKR/p IO93AD. 13.10.94 2005 G1RST IO95EF. 14.10.94 1123 SP7IWM JO91QI, 1128 SP7ZX KO01BW, 1519 OK2BFH JN99FN. 16.10.94 1507 SP6MLK/p JO80JG. RIG 19El-F9FT+ 50W. tnx fr info, Matthias

***DJ8ES, JO43, wkd:*** 20.07.94 G1WYC JO02AT 642, G4IVN JO02UP 540. 26.07.94 SM6GXV JO58RG 491. 11.10.94 G4PIQ JO01MU 616, G4SHF IO92IO 735, G3LNR IO92JV 721, G1XWD JO03CE 621, OS4GG JO20AR 519, G8NEY IO81VK 839, G4HRY/p IO92JE 744, G4UDE IO82KT 848, G8OHM IO92AJ 785, G3CKR/p IO93AD 764, G4PIQ JO01MU 616, G8CRN JO02FB 643, G6IQM IO92JH 739. 14.10.94 SP2DDV JO93AK 562, SP3IAS JO81SX 579, SP6BLZ JO81AM 515, SO3EP JO81SX 579, SP9MQU JO90LF 765, SP5QGT JO92QF 684, SP7OGR KO01AL 758, SP5FKW KO02MG 789, SP3DRT JO91CQ 635km. tnx fr info, Wolfgang

***DK0ALK, JN48AB, 15W, 16el., wkd Oct 1st:*** DL0HU/p JO44, PA6C JO33GB 566, OE5VRL/5 JN78DK 464, PA3FPQ JO21VX 464, PA3PBC/P only hrd. tnx fr info, Michael

***DK0PX (Op DH3IAJ), JN48JC, wkd:*** 23.09.94 SP6MLK/p JO80JG. 01.10.94 G4VIX/p JO01PU, S5/IV3DVB JN65WW, PA6C JO33GB, OM3KHE/p JN99JC 743km ODX, PA3BPC/p JO21BX, OK1KJB/p JN79IO, S53M JN86BS, OM3XI JN88UU, OK1KQW/p JO80EH, OK1OEA JO80FG, PA0PLY JO22MH. tks fr info, Ralf

***DL0LN/p, (Op DH3YAK) JO31PW, wkd Oct 1st/2nd:*** OE5XBL JN68PC, DJ5MN JN68DG, HB9BA/p JN37SG, DF0TEC/p JO73CF, OZ9EDR/p JO64GX, DL1GBQ/p JN47RU, OK1KNF/p JN69JJ, DL0WSW/p JO60US, OK1KIR/p JO60LJ, DF9UV/p JN48JE, DJ7LH/p JN58FP, OK1UFM/p JN69GX, DG3GAQ JN48GE, DL7AKL JO62PM, G4VIX/p JO01PU, F6HPP/p JN19PG, DL0UL/p JN48UO, F6KIM/p JN38AJ. tnx fr info, Winfried

***DK1VI, JN49HH, EJ54f, wkd:*** 070594 G4PUB/P jo01pu 591km G8FBG/p jo02qd 601km G4HRY/p jo01kj 538km 050694 S5/IV3DVB jn65ww 541km 190694 S53N jn65ww 541km IW4BET/4 jn54pg 594km 030794 G4JAR/p jo01pu 591km G4MRS/P jo02pa 599km Stn: IC402, GaAs-Fet Pre-amp, PA 100W HF, 21 El. F9FT tnx fr info, Ernst

***DK8VR/A, JN39NR wkd Oct 1st/2nd 600km:*** OZ9EDR/P 64, GU3EJL 89, F6CTT 97, G3KPV 91, GW6ZUQ 81, F1DUZ/P 97, F6KFV/P 99, F6KPQ/P 87, GJ7AOG/P 89, GJ4ZUK/P 89, G8OHM/9 92, F1SAH 88, G4BRK 91, G4WKN 92, G4WDL/P 93, GJ7LJJ 89, F6EYM 99, OE1FBU 78, S5/IV3DVB 65, OK1OEA 80, OE3EFS/3 78, OK1KPA 79, OK2PQR/P 89, G4BRA/P 91, OM3CQF/P 88, OM5MX/P 98, G3NAQ 91, OK2TT/P 80, OK1KCR/P 79, OE8TPK 76, HG1W 87, S53M 86, S51ZO 86, SP6MLK/P 80, OK2PWY/P 89, OM5CM/P 98, OK2KMT 88, OM3KHE/P 99, OM3XI/P 88, OK2KIS/P 99, OK5VHF/P 70, HG7B/P 97, OK1KQW/P 80, OK2BRB/P 89, F5MZN 87, OK2TF/P 80, SP6LB/M 70, OL7C/P 99, SP9WY/P 99, OZ6HY 45, OK2KDJ/P 99, OK2KHF/P 89, OK2BMU/P 89, OM3B 98, OK2PHM/P 89, OK1AIY/P 70, OK2BPN 89, OK2JI/P 80, SP9EWO/9 99, G4KGC 92, G6YXT 80, DL6NVC/P 73, G4UDE 80, I5BLH 53, IW5BVM 52, I1CPN 34, OE3JPC 88. tnx fr info, Eugen

***DL0UL/P, (Op DL2SAX), JN48UO, wkd Oct 1st/2nd:*** DL3LAB JO44XS 687, DL8QS JO43KH 527, PI4KGL JO22GE 542, DG9BDV JO33PE 538, DH7ARB/P JO53HX 602, PA3AKM JO32BS 528, DB8WJ JO33TH 544, DL9GJW/P JO54VC 629, DL0OU/P JO43UF 515, DJ1EH JO43WH 524, DG4BR JO33RD 530, DG9BEM/P JO43CE 521, OZ9EDR/P JO64GX 736, DB4LL JO44SM 659, DL0HU/P JO44OJ 646, DJ8YZ JO43KC 504, OK1OEA JO80FG 523, DL0LH JO43XO 557, OK1KQW/P JO80EH 518, OK2KDJ/P JN99BM 622, OK2KDS/P JO80KE 548, OE3GAA JN88GE 507, PA3BLS JO22NT 569, G6HKM JO01FT 749, DK3JU JO43RE 511, DL2NA JO43GN 558, DJ9RX JO43LE 513, HG5FMV JN97KR 687, OM5MX JN98BI 622, OM8CQF/P JN88RT 570, OK2KHF/P JN89VP 600, OK2KJU/P JN89SJ 579, DG3BBI JO33PE 538, DK0TU JO62PM 504, HG1W JN87GF 532, G4PIQ JO01MU 715, PE1EWR JO11WH 515, OS1ARQ JO10VX 501, G4NPH JO02BI 796, G8OHM/P IO92GB 881, F6KGT/P JN19DG 547, DL6NVC/P JO73AL 621, DL7UDA JO62TK 509, S51ZO JN86DR 536, HA2ML JN97EO 654, HG7B/P JN97KW 683, OM3XI/P JN88UU 588, HG1Z JN86KU 571, OM5CM/P JN98CL 627, S53M JN86BS 522, OE8TPK/8 JN76WQ 509, 9A3AQ JN75WS 563, IK4DCX JN64GA 555, 9A2SB JN95GM 752, HG5BDJ/7 JN97KP 689, OK2KMT JN88TU 582, PA3CNX JO22MC 511, OL7Q/P JN99FN 647, OM3KHE/P JN99JC 668, OK2PWY/P JN89NX 560, OK2KIS/P JN99CL 628, G4MRS/P JO01MU 715, ON1AEZ JO11VA 503, SP6MLK/P JO80JG 545, OK2KTT/P JO80IA 532, 9A3B JN95FQ 737, PA6C JO33GB 544, OK2BHK/P JN99HO 659, OK2BMU/P JN89VP 600, SP9SDF/9 JN99LN 683, DF0TEC/P JO73CF 604, SP9WY/P JN99MS 691, HA6VK JN97WV 757, G3XDY JO02OB 716, PI4GN JO33KK 573, PA0DUO JO33NB 528, PA3GCV JO32LU 511, PE1LJS JO22OI 525, 9A1CDD JN85IR 619, HA8ET KN06DQ 821,

HA8NM JN98PB 712, OM3ZDM JN88NC 551, HG6Z JN97WV 757, G4RGK IO91ON 818, PI2KEI JO22SI 511, EA3DJL JN12IK 876, DL0CS JO44WQ 677, DL6AM/P JO43RO 557, OZ6HY JO45WA 714, DL6BCR/P JO43RE 511, DB8WK JO33XN 565, G4ALE/P JO01QE 663, PA0AD JO22JC 523, DC7MH JO62QO 515, DK0FFO/P JO72BO 544, F6KFV/P IN99IO 809, PA0GUS JO23TA 569, S57QM JN76PB 507, SP9MRK JO90NH 707, SP9HWY JO90NH 707, SP9EWO/9 JN99LP 684, GJ4ZUK/P IN89WF 868, HA5EA/4 JN97HE 684, HA5BDJ/7 JN97KP 689, HA1DAZ/P JN87GP 519, HA2RD JN87WB 634, HA1WD JN87GF 532, 9A2RK JN75TR 550, 9A1EZA JN86HG 582, PA0WWM JO22FE 546, PA0HRK JO21EX 534, G4VIX/P JO01PU 700. Rig: 600w, 4 x 17ele. tnx fr info

*DL1KDA, JO30FQ wkd 500km:* 11.10.94 G8ECI JO03AK 534, OZ9EDR JO55UL 637, OZ1DOQ/P JO55QJ 618, OZ6HY JO45WA 534, SK7BT JO65NN 701, OE2SCM JN67MT 575, G3NAQ IO91HL 554. 12.10.94 G0TDF IO92CM 605, G4ERG IO93SR 580, G8PNN/P IO85XE 757, G3MEH IO91QS 508, G3KPU IO93EN 637, G4UDE IO82KT 700, G3YHF IO92BK 608, G1COW/P IO91PK 508, G1XWD JO03CI 520, G/OE3JDA IO93EU 653, G8DQK IO83RK 686, G4DDL/P IO91MQ 528, G0JPD IO92NG 537, G4DHF/P JO03AE 520, G3KPV IO91LK 530. 13.10.94 G1HXH IO95FE 733, LA3TL JO58SX 977. tnx fr info, Alex

*DL2FDX, JO40LG wkd:* 1.10.94 IW4OAT/4 JN54OK 670, IW1CLE JN45FD 571km. 2.10.94 DL3LAB JO44XS 505, DL6NVC/P JO73AL 500, F6BSJ/P JN26IS 500, OL7Q/P JN99FN 684km. RIG: 41ele DJ9BV 9,3m Boom + 4X150A 200W + TS-790 tnx fr info, Oliver

*DL3YEE, JO42, wkd:* 26.4.94 S51ZO JN86DR 825. 13.6.94 LA9SJ JO59HQ, LA6LCA JO59FE. 19.6.94 OE5XBL/5 JN68PC. 8.7.94 LA9SJ, LA6LCA. 16.7.94 F5KCR/P JN26IX. 24.7.94 G4DSP/P JO03CE, G6SRC/P JO01JG. 29.7.94 ES0WE/5 KO078XX 1066km. 29.9.94 OE5VRL/5JN78 DK, F1DBE JN09VE, G4RGK IO91ON. 30.9.94 SP6MLK/P JO80JG. 11.10.94 SP1NVC/P JO83BJ. 12.10.94 G0NMG IO90QS, G6ODT IO92QI, G0TDF IO92CM, GI8AYZ IO64XM, G8PNN/P IO85XE, G4UDE IO82KT, G6URX IO94EX, G8OHM IO92AJ, G8NEY IO81VK, SP3TYF JO82FH, G3WDG IO92RG, SP3IAS JO81SX, SO3EP JO81SX, G3KPV IO91LK, G4BRK IO91DP, F1DBE, G8CRN/P JO02FB, G3GNR IO70WT, F5NS IN99TH, G0EHV IO94FW, G8VOI/P IO90MX, G4FCD IO91KX. 14.10.94 G4BRK IO91DP, SP6AZT JO81NG. 15.10.94 G4WJS IO91NP, G7KPR/P IO82TC. tnx fr info, Klaus

*DL4KG, JO31NA, wkd 500km Oct 1st/2nd:* F6CTT IN97HV 705, F6KPQ/p IN87KW 815, OZ9EDR/p JO64GX 570, OE5VRL/5 JN78DK 589, F6KFV/p IN99IO 617, GJ4ZUK/p IN89WF 688 km. Rig: 100w + 20ele. tnx fr info, Gerald DL4KG wkd 70cm Oct 12th/13th: 54 QSOs with following squares: IO81, IO82, IO83, IO85, IO90, IO91, IO92, IO93, IO95, IN88, IN99, JO02, JO03, JO93 (SP2DDV ODX 780 km). Rig: 100 W + 20.-Ele-Yagi, (140 m ü. NN) tnx fr info

*DL4RU/P, JN69BS, wkd Oct 1st/2nd:* IK4DCX JN64GA 640, PA3BPC/p JO21BX 612, IW4AOT/4 JN54OK 597, DB8WK JO33XN 510, DG3BBI JO33PE 506km. Rig: 50w, 4 x 20 ele. tnx fr info, Karl

*DL6AM/p, JO43RO, wkd on Oct 1st/2nd: Rig:* 120W, 2 x 19 El. (Süden/Norden umschaltbar), 220m a.g.l. auf einem Kraftwerkschornstein. QSOs 550 Km: HB9BA/P JN37SG 715, HB9SUL/P JN47PH 697, F6HPP/P JN19PG 643, OK2KDS/P JO80KE 635, DJ5MN JO68DG 624, G4VIX/P JO01PE 584, SP2DDV JO93AC 574km. tnx fr info, Ronald

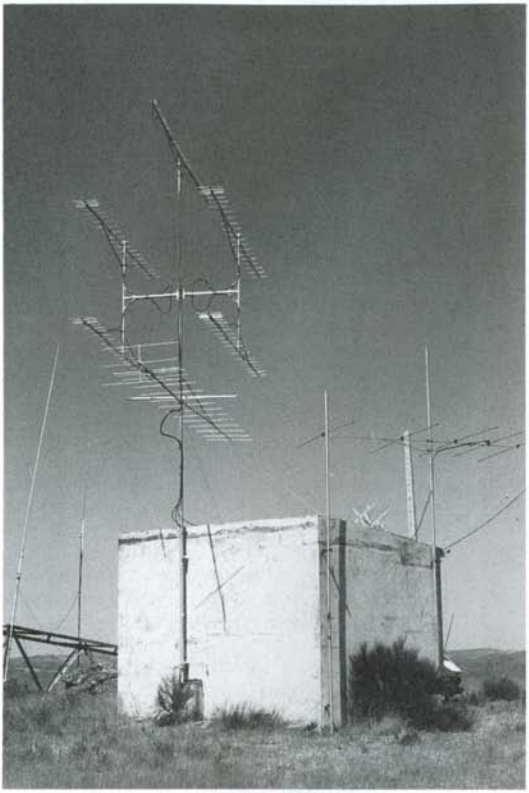
*DL8BDU, JO43 wkd 500km:* 02.05.94 G6RAF IO92QP 583. 04.05.94 DK9MN JN58TC 602. 05.05.94 DK9MN JN58TC 602. 07.05.94 HB9JAW JN47CE 646, G4HRY/P JO01KJ 522, DG1MHY/P JN68CF 607, DJ5MN JN58WH 588. 08.05.94 G3CKR/P IO93AD 670, DL0UL/P JN48UO 503, DL1MBV JN57UX 619, DL4MEA JN58JD 574, DL5MHB/P JN58KI 554. 13.06.94 OZ1IPU JO57GH 503. 02.07.94 GM4MRS/P IO86RW 802, GM3ZBE/P IO86RW 802, OZ4EDR/P JO75JE 501. 03.07.94 G3ZPB/P IO91XH 582, G4UHF/P IO91GI 673, G0ULT/P IO91IH 663, DF9UV/P JN48JE 540, OK5VHF/P JO70UR 584, OK1KJA/P JO70PU 552, SM6MVE JO67KW 625, G0FRR/P IO80WP 746, G4ZOD/P IO91XH 582, G4FAM/P JO01LD 526, G8XVJ/P IO93AD 667. 08.07.94 LA8SJ JO59HQ 758, LA6LCA JO59FE 701. 10.07.94 DL1MBV JN57UX 617. 22.07.94 G7RRD IO92XT 542, G8BAV IO92GV 636. 24.07.94 G1HWY IO90UV 617, G3KPV IO91LK 612, G8XVJ/P IO93AD 667, G0FIG IO90UU 619, G4IJL IO92KX 614, SM6HYG JO58RG 621, G7NIC IO93AU 668. 21.08.94 DF1NP/A JN58OV 509. Rig: FT790R, PA 200W, 8X20 Element, VV DJ9BV, 23m über Grund tnx fr info, Klaus

*DL9LBH, JO31AB wkd Oct 1st/2nd 500km:* DL5MAE JN58VF 520, DJ5MN JN68DG 546, F6CTT IN97HV 641, DL7AKL JO62PM 524, G4BRA/P IO91GI 523, DL0WSW/P JO60US 538, DF7ZZ/P JN57GN 508, F6KFV/P IN99IO 545. Rig: FT-790R + DAIWA LA-4030 + SSB-K70 = 400 Watt, 2x 19 Element Yagi + SP70 von SSB. tnx fr info, Hans-Walter

*F6KGT/P (Op F1NQP), JN19DG, wkd Oct 1st/2nd:* F6KNB/P IO94UU 645, DF0HF JO50SF 672, DL9NDS/A JN59UX 682, DG7NBE/P JO40XI 562, DL0UL/P JN48UO 546, PI4KEI JO32SI 503, DG6NEL JN59MI 633, DL0GTH JO50JP 626, DF1IAZ/P JN49RB 521, DG7SFL/P JN49VF 544, DL0SC JN48XT 560, F6ATQ/33 IN94RT 540, DF7ZZ/P JN57GN 637km. Rig: 100w, 4 x 21 ele. tnx fr info, JEAN-JACQUES

*F6KPQ/p, (Op F6ETI), IN87KW, wkd Oct 1st/2nd 700 km:* DF2VJ/P JN39NO 750, DK8VR/A JN39NR 776, OS7WP/P JO30AM 725, F/OK2KKW/P JN38OJ 768, DB8FD/P JO30WB 837, DL4KG JO31NA 816, DL9NDS/A JN59UX 1106, DB4VO JN39IH 739, DL0TS JO40FF 881, DK0BN/P JN39VX 829, DL8PC/A JO40NK 933, DD5CM/P JN48CO 842, DL0KK/P JO31GJ 795. Rate was 446 km/QSO! tnx fr info, Philippe

*IW4AOT/4 (Ops IW4AOT, I4YNO, I4JED), JN54OK, 440m asl wkd Oct 1st/2nd:* DG9NCX 59, OL7B/P 99,



## CT1WW: 1kW/1x17Y (2m), 1kW/4x21Y (70cm),150W/1x55Y (23cm)

DL2FDX 40, HG1B/P 97, DF2VJ/P 39, F5FNY/P 26, F5JNX 39, SP9SDF/P 99, OK2KJU/P 89, OK2KHF/P 89, OM3CQF/P 88, SP9EWO/P 99, SP9MRK 90, OK2BPN 89, OK1KCR/P 79, OK2PQR/P 89, OM3CDR 88, OK2TT/P 80, OK1KPA 79, OK2KDS/P 80, SP9EWU 90, OM5MX/P 98, OM3ZDM 88, SP9WY/P 99, SP9EML/P 99, OK2KIS/P 99, OK2WDC 89, OK5VHF/P 70, OK1OEA 80, OK2BQR/P 99. tnx fr info, Alex

*IW9CER, JM78QF wkd:* 19.6.94 EA6QB 08. 25.6.94 F1BAV 33. 1.7.94 EA6QB 08. 7.8.94 EA5YB 99. 15.8.94 IW1QBJ/1 44, IK1CRN 44. tnx for info, Tony

*LA8AK, DS80b, JO38 wkd:* 13.10.94 OK1DFC GK, DB6NT/A FK, ON4YZ CK. 14.10.94 OK2BLE JJ, SP7IWM JL, SP7CNA JL, SP7ZX KL, SP2FAV JO, SP2DDV JN. tnx fr info

*OM3B, JN98LR wkd Oct 1st/2nd:* DL1MBV/P JN57UX 542, IK4DCX/4 JN64GA 718, S5/IV3DVB JN65WW 493, DJ5MN JN68DG 494, DK5MV JN58WH 524, DJ1OJ JN57SE 578, DK0IG JN58SE 550, DF0YY JO62GD 592, DK0BN/P JN39VX 820, DL6NAA JO50VF 544, DK8VR/A JN39NR 866 ODX, DL0TS JO50FF 636, DL6FBL JO40XL 677, DL0GTH JO50JP 625, DH3NAN JO50NC 587, DL0NN JN57UU 545, tnx fr info, Tibor

*OZ9EDR/p, JO64GX, wkd Oct 1st/2nd 500km:* RIG: 2*4CX2350, 4*21 el F9FT. OPRs: OZ1BGZ, OZ1DOQ, OZ1FTU, OZ1KRF, OZ1RH. HB9SUL/P JN47PH 882, G4VIX/P JO01PU 821, DL1GBQ/P JN47RU 820, SP9FG JN99XF 815, DL0UL/P JN48UO 735, SP9WY/P JN99MS 727, OK2BHK/P JN99HO 726, OL7Q/P JN99FN 724, DF2VJ/P JN39JO 714, DK8VR/A JN39NR 690, DB9IZ JN49DI 689, SP9MRK JO90NH 682, SP9EWU JO90NH 682, OS5UM JO21FF 681, OS7WP/P JO30AM 661, PA3BPC/P JO21BX 649, DK0BN/P JN39VX 642, OK2PWY/P JN89NX 636, DF9FD JN49GU 631, PA3AWH JO21GW 628, OK2JI/P JO80NB 628, DL0WX JO30FQ 628, PA0WWM JO22FE 617, OK1KJB/P JN79IO 616, PI4KGL JO22GE 612, OK2KDS/P JO80KE 608, PA0WMX JO21SM 603, DL2NBU JN59KQ 599, PA3FPS JO22IJ 590, PA3CNX JO22MC 589, DL0UHP/P JO31EE 589, OK1OEA JO80FG 586, PA0RDY JO22KJ 580, DL1EKM JO31GF 578, PA0PLY JO22MH 576, DG1EEM JO31GG 574, PA0EZ JO22OF 572, DL4KG JO31NA 570, DL0KK/P JO31GJ 564, PA3FPQ JO21VX 557, DL8PČ/A JO40NK 555, DF2JQ JO31HL 553, DL0GH JO40JN 552, PI4KEI JO22SI 545, DG3FK/P JO40UJ 544, DG7NBE/P JO40XI 543, PA3BLS JO22NT 542, DK5DQ/P JO31PG 541, DL5DAV/P JO31PG 541, SP3NNH JO81WJ 534, DL6NAA JO50VF 531, DL9NDA/P JO50VF 531, DL6FBL JO40XL 530, DK4VW JO40IT 530, OK1XFJ/P JO60CF 529, DK0UB JO31PK 526, OK1KKL/P JO70PO 520, OK5VHF/P JO70UR 518, DG2DCI/A JO31NP 516, DD4FA JO41HA 512, OK1KVK/P JO60JJ 510, OK1KIR/P JO60LJ 510, PA0GUS JO23TA 502, DL0PL/P JO50XL 502. tnx fr info, Uffe

*PA0WWM, CM63g wkd 500km 70cm:* 13.10.94 OK2BLE JJ33G, SP6AZT IL75B. 14.10.94 G3GNR XK20G, GW4HDF YL34B, G1KHX YL56H, SP2FAV JO76F, SP3JMZ IM45E, DL5DWF HL71F, SP7ZX KL01J. tnx fr info, Wim

*SM3BEI, JP81NG wkd Oct 1st:* SM6FHZ, JO57XJ, 522 km. tnx fr info, Lennart

*TK/HB9MMM/p, JN42MM wkd 500km:* 9.7.94 EA3BHR 11. 12.7.94 EA3AND 11. From JN42RU: 16.7.94 IT9IPQ/9 78. tnx fr info, Püüp.

# 6m News

**Editor: Joachim Kraft, DL8HCZ**

*4U9ITU, JN36BF (Op DJ2XS) wkd on 50MHz:* 24.-28.5.94 MS: PA3FYM, PA3GML JO22SA, PB0ALN JO22QD, PE1OUC JO22MD, DJ4AX JO31PK, DL9USA JO71, PA0JMH JO22OG, DL9GS JO31OM, DJ6TK JO53FG. tnx fr info, Matthias

*DJ2XS, JO53 wkd:* 1.9.94 0825-0830 DL9USA JO71EN, SP6RLA JO81, SP5EFO KO02MD, SP9SDF JO90, OE1TKW JN88. tnx fr info, Matthias.

*DL8EBW, DL66a, JO31NF wkd:* 02.10.94 4N1SIX KN04, YU1QC KN04fu, YU7FU KN04, YU1QC KN04fu. tnx fr info, Guido

*DL8HCZ, JO53AP wkd:* 13.8.94 OM5MX JN98, SP6BTI JO81, OK2BGW JN89, OK2RS JN89, OM3CLS JN99, SP7BSB JO91, SP6NVN JO81, OK2PPP JN99. 23.8.93 YL3AG KO26. 2.10.94 I6VYV JN62, 9A2BZ JN64.

*I4XCC, JN63 wkd:* 02.07.94 1A0KM JN61FU T. 04.07.94 UU8JJ KN74CK. 15.07.94 GM3BOC/P IO88BA. 16.07.94 ES2RW/0 KO18XC. 28.07.94 ES5WE/0 KO07XX MS. ES5WE/0 KO07XX, RU1A KO48VR, SP4TKK/4 KO12, ES0NW KO18JW, ES1II/0 KO18JX. 02.08.94 RA3YO KO73. 23.08.94 YL3AG KO26AW. tnx fr info, Claudio

*JX7DFA, IQ50 wkd:* 020794 1722 S59A (First S5-JX), 1734 DL7AV, 1737 G2ADR, 2146 DK2PR, 2203 LA9ZV+, 2233 OZ1LO, 2237 OZ7GML, 2250 PA0OOS, 2305 G3MCS, 2307 PE1OUC, 08 G3KNU, 09 PA2VST, 10 PA0LSB, 12 PA2VST, 13 PA0JMH, 14 PA0HIP, 15 ON4ANT, 16 PA0ERA, 17 PA0JMH, 20 PA3BFM, 48 GM4ILS, 050794 2340 GM0ILB (IP90). QSL: JX7DFA, PER-EINAR DAHLEN, N-8099 JAN MAYEN, NORWAY

*LA5TFA/p, JP89KB wkd via MS or Aurora-E:* 10.08.94 LA6QBA, SM7FJE, SM3EQY, SM7AED, ES5MC, OZ3SDL, SM6CMU, OZ7DX, SM6EHY, SM6FHZ, SM0FFS. 11.08.94 SM3EQY, SM7CMV, hrd OH9SIX, hrd GB3LER. 12.08.94 SM7AED, SM7FJE, SM0FFS, OZ1FQN, LA9ZV.

*LA5TFA/p, JP98AW wkd via MS or Aurora-E:* 12.08.94 SM7AED, SM7FJE, SM6CMU, SM3EQY, OZ3SDL. 13.08.94 OZ1LO, SM4BRD, SM3JGG, SM0FFS, SM3EQY, SM6EHY, OZ8RW, hrd OH9SIX, hrd GB3LER, hrd ES6SIX. 14.08.94 SM7AED, SM6KJX, hrd LA7SIX, hrd OH9SIX, hrd GB3LER. tnx fr info, Stefan

## 50Mc- ES - season in UA3T...

Since 15th May till 1st of August club station of the VHF -Committee of the Union of Radioamateurs of Russia (SRR) was very active on 6 metre band with call R3VHF (sqr: LO16XG). Radiostationn with call R3VHF belongs to the Nizhny Novgorod Regional Centre of Technical Creation. Amateur radio club began its work in 1947.Our childrens collective got its first callsign in 1958. It was 056055. Later call changed to RA3KON, UA3KON, UK3TAC, UZ3TXA, UZ3TXBand newRZ3TXA and UA3T. R3VHF callsign was got by vhf-Committee of Russia for using on VHF-net frequencies, for transmitting information from our country to others, from other countries to our and also for experimental QSOs. Thanks to personal assistenceof the President of SRR Valery Agabekov (UA6HZ) license was received for using 6 metre band for amateur radio communicationby R3VHF since 15th of may till 1st of November1994. Equipment used by R3VHF is similar toused during RU1R VHF expedition to KO82 (june 1993) - homemade tranceiver(28MHz) + trvtr RA3TES (15 W PEP) + 5 element rotary yagi. The results are seen from R3VHF log. What is expected in 1995? In spite of economical problems in our country the VHF Committee of Russia plans creation of radio equipment for using in expeditions to the "white spots"on the map of our country. Documents regulating the using of 6metre band will be worked out. Availability of TV broadcasting on the 1st TV cannal in many regions of Russia makes this problem not easy tosolve. Planed is also a beacon R3VHF on 50.043 Mc. 73 from Russia, Oleg R3VHF tnx for info, Oleg

*R3VHF, LO16XG, Sporadic-E season 1994:* 15 MAY 06-09Z-YU,S59,SP,OK,DL.10 QSO. 16 MAY 07-10Z-SV, YO, 9H, SP, F, DL, EH. 13 QSO. 17 MAY 13-18Z-OK, DL, F, SM, OZ, DL, EU, G, I, GM, GD, ON. 52 QSO. 19 MAY 11Z-OZ.1 QSO. 21 MAY 07-12Z-DL,OZ,ES,G,I. 7 QSO. 22 MAY 08Z-YU,S59. 12Z -SP,ER. 4 QSO. 23 MAY 09Z-OH, SM. 3 QSO. 24 MAY 05Z-OH1NSJ/OH0 1 QSO. 01 JUNE 09-14Z-YO, SP, DL, OE, OK, 9H, OZ, SM, LA, G, GW. 53 QSO. 02 JUNE 05-15Z-JY, YU, SP, S57, ES, EH, I, G, OK, OM, 9A, PA. 40 QSO. 03 JUNE 07-14Z-SP, DL, EU, OK, 5T5JC, YO,LZ, OZ, F.39 QSO. 04 JUNE 08Z-RA3TES/tropo - 100km./ 1 qso. 10 JUNE 08-12Z-EU, OH9, LA, SP, OK ,OM,YU. 11 QSO. 11 JUNE 05Z-ES5MC /MS QSO/ 1 QSO. 15 JUNE 11-16Z-YO, OK ,SP, DL, LA, SM. 15 QSO. 16 JUNE 07-08Z-ES,DL. 16-17Z-DL, YU, YO, OE, S52, OM, EH6 ,LZ, 9A, I. 24 QSO. 18 JUNE 06-23Z-UU, I, OK, EH, OE, 9A, F, CT, OH, EH6, SP, G, GW, ES, SM. 66 QSO. 19 JUNE 05-08Z-OH, ON, DL, OH9. 9 QSO. 22 JUNE 06Z-OZ. 18-19Z -DL. 8 QSO. 23 JUNE 08Z-SM. 1 QSO. 24 JUNE 11Z-OZ,OK. 5 QSO. 02 JULY 13-22Z-9A, G, GW, GU, PA, HB, F, DL, EH, OZ, SM, OH. 88 QSO. 04 JULY 14-21Z-OH, SM, OH9, ES, SM, LA, OZ, GM, DL, SP. 44 QSO. 08 JULY 11-12Z-SM,OH. 3 QSO. 11 JULY 12-13Z-SP,DL. 4 QSO. 16 JULY 10-11Z-S59,DL. 4 QSO. 17 JULY 11-12Z-YU,DL. 3 QSO. 19 JULY 06-09Z-LA, G, DL, ES, I, SP, SM, OZ. 36 QSO. 04 AUG 06-09Z-OZ, DL. 3 QSO. 13 AUG 10Z-DJ5MN/LZ. 12-14Z-SP, F. 5 QSO. 23 AUG 08-10Z-9A,S57. 3 QSO. tnx fr info, Oleg

# Meteor Scatter

**Editor: Norbert Göttsche, DL8LAQ**

**Dear OM!**

**Due to a change of the style of the MS column I have to use a few short cuts: c = complete, m = many, nc = not complete, nil = not in log (no reflections!), r = random, s = ssb and t = tailend.**

### DF1IAZ (JN49LD) wkd on 144MHz:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 940806 | | | | | | | | | |
| 0800 0900 | OH9NYW | KP25GR | - | - | - | - | - | nil | *1 |
| 940807 | | | | | | | | | |
| 0400 0455 | S51AT | JN75GW | 27 | 27 | 8 | 20 | 0.5 | c | *2 |
| 940807 | | | | | | | | | |
| 2000 2100 | UT5ER | KN78ER | - | - | - | - | - | nil | *3 |
| 940809 | | | | | | | | | |
| 0200 0300 | HG7B/0 | KN18GD | 27 | - | 3 | 9 | 2 | nc | |
| 0700 0800 | EA6/HB9FAP/P | JM29DX | - | - | - | - | - | nil | |
| 2100 2150 | GM4YXI | IO87WI | 27 | 27 | 8 | 33 | 1 | c | |
| 2300 2345 | SM5MIX | JO78JG | 27 | 27 | 10 | 19 | 3 | c | |
| 940810 | | | | | | | | | |
| 0000 0100 | IS0YFG | JM49NF | - | - | - | - | - | nil | |
| 0600 0700 | LA2PHA | JO38IB | - | - | - | - | - | *4 | |
| 1500 1555 | LZ1KWT | KN32FR | 27 | 27 | 5 | 2 | 0.5 | c | |
| 2100 2135 | US5WU | KO20DI | 26 | 27 | 5 | 14 | 0.5 | c | |
| 2200 2300 | HA8CE | KN06EN | - | - | - | - | - | nil | |
| 2300 2400 | GW4UWR | IO81LP | - | - | - | - | - | nil | |
| 940811 | | | | | | | | | |
| 0500 0600 | GW0PZT | IO72PT | - | - | - | - | - | nil | |
| 0600 0700 | OH5IY/4 | KP31JK | 27 | - | 1 | 3 | 1 | nc | |
| 1300 1400 | ES5MG | KO38IJ | 27 | 27 | 3 | 8 | 10 | c | |
| 1900 1955 | YU7EW | KN05HP | 27 | 27 | 4 | 23 | 6 | c | |
| 2000 2100 | IT9NAN | JM77NO | - | - | - | - | - | nil | |
| 2100 2145 | G0CUZ | IO82WM | 27 | 27 | 9 | 27 | 7 | c | |
| 2200 2300 | YZ7UN | KN05EI | - | - | - | - | - | nil | |
| 2300 0000 | SM7TUG | JO76SJ | 27 | - | 3 | 7 | 0.5 | nc s | |
| 940812 | | | | | | | | | |
| 0000 0100 | EJ9HW/P | IO43VX | - | - | - | - | - | nil | |
| 0100 0200 | IK0IXI | JN52WD | - | - | - | - | - | nil | |
| 0200 0300 | YU7AU | KN04HU | 26 | 26 | 3 | 65 | 2 | nc | |
| 0411 0411 | OY/G4PIQ | IP61QJ | 37 | 37 | 1 | 0 | 20 | c s r | |
| 0900 1000 | UA3XFA | KO73OU | - | - | - | - | - | nil | |
| 1000 1100 | OH9NYW | KP25GR | 37 | - | 2 | 2 | 6 | nc | |
| 1100 1113 | SP9PRO/7 | KO10AT | 26 | 26 | 2 | 0 | 6 | c s | |
| 1200 1300 | EA7TL | IM76GD | - | - | - | - | - | nil | |
| 2100 2135 | EI4DQ | IO51WU | 27 | 26 | 36 | 35 | 16 | c | |
| 2200 2300 | GM4VVX/P | IO78WA | 27 | 37 | 2 | 13 | 8 | nc | |
| 940813 | | | | | | | | | |
| 1211 1315 | GM4VVX/P | IO78WA | 27 | 27 | 13 | 24 | 13 | c | |
| 2200 2300 | 9A1CDD | JN85LW | - | - | - | - | - | nil | |
| 2300 0000 | OH6AAO | KP14RC | 27 | - | 2 | 1 | 0.2 | nc | |

Remarks: *1 2053km *2 Sidescatter *3 1848km *4 Not QRV due to thunderstorm, sri. Equipment: 100W, 14ele DJ9BV (9m agl). PR: DF1IAZ @DB0RBS.#BW.DEU.EU. 73, Ralf.

### DH6JT (JO31JO / DL34b) wkd on 144MHz:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 940611 | | | | | | | | | |
| 1140 | 9A1CCY | JN85 | 26 | 26 | 5 | 5 | 1 | c | |
| 940617 | | | | | | | | | |
| 0300 | EA4LY | IN80 | 26 | 26 | 15 | 28 | 2 | c | |
| 0400 | 9A1CHI | JN95 | 26 | 26 | 4 | 5 | 2 | c | |
| 0500 | F9HS | JN03 | 26 | 26 | 10 | 24 | 2 | c | |
| 940618 | | | | | | | | | |
| 0600 | EB4TT | IN70 | 26 | 26 | 6 | 7 | 4 | c | |
| 1105 | S51AT | JN75 | 26 | 26 | 17 | 19 | 1 | c | |
| 940620 | | | | | | | | | |
| 0400 | HA3UU | JN96 | 26 | 26 | 5 | 12 | 1 | c | |
| 940621 | | | | | | | | | |
| 0500 | I5WBE | JN53 | 26 | 27 | 9 | 20 | 2 | c | |
| 940626 | | | | | | | | | |
| 0800 | EA6VQ | JM19 | 27 | 37 | 15 | 23 | 2 | c | |
| 940709 | | | | | | | | | |
| 0500 | TK/DC3VW/P | JN42 | 27 | 27 | 13 | 21 | 2 | c s | |
| 940720 | | | | | | | | | |
| 0600 | EA2LU | IN92 | 26 | 26 | 5 | 8 | 1 | c | |
| 0620 | EA2AGZ | IN91 | 27 | 27 | 6 | 10 | 25 | c r | |
| 2100 | S57EA | JN76 | 26 | 26 | 3 | 9 | 1 | c | |
| 940725 | | | | | | | | | |
| 0500 | OM9AEM | KN08 | 27 | 27 | 6 | 13 | 3 | c | *1 |
| 940727 | | | | | | | | | |
| 0400 | 9A2KK | JN85 | 26 | 27 | 9 | 13 | 1 | c | |
| 940729 | | | | | | | | | |
| 0000 | ES5WE/0 | KO07 | 26 | 26 | 3 | 4 | 1 | c | |
| 940730 | | | | | | | | | |
| 0400 | SP2OFW/P | JO83 | 26 | 26 | 4 | 5 | 1 | c | |
| 940802 | | | | | | | | | |
| 0300 | OH8UV | KP34 | 26 | 27 | 3 | 5 | 1 | c | *2 |
| 0400 | F6DRO | JN03 | 27 | 27 | 5 | 7 | 6 | c | |
| 0500 | GM4IPK | IO99 | 27 | 27 | 17 | 42 | 3 | c | |
| 1140 | OK2SBL | JN99 | 26 | 26 | 7 | 6 | 1 | c | |
| 940806 | | | | | | | | | |
| 0000 | HG7B/0 | KN17 | 27 | 27 | 9 | 10 | 2 | c | |
| 940808 | | | | | | | | | |
| 0500 | HG7B/0 | KN18 | 26 | 26 | 4 | 10 | 2 | c | |
| 940811 | | | | | | | | | |
| 2000 | SM7SJR | JO87 | 26 | 26 | 6 | 11 | 2 | c | |
| 2200 | SP9PRO/7 | KO10 | 36 | 26 | 15 | 8 | 7 | c | |
| 940812 | | | | | | | | | |
| 0400 | 9A4EW | JN95 | 26 | 26 | 3 | 4 | 17 | c | |
| 1226 | OY/G4PIQ | IP61 | 27 | 27 | 1 | - | 15 | c s r | *3 |
| 940813 | | | | | | | | | |
| 0530 | EA4ED | IM79 | 26 | 26 | 6 | 2 | 5 | c | |

Remarks: *1 WAE #47 *2 1870km *3 SSB-Random QSO. Comments: Peak of Perseids 94 at 120804 from 08-12 utc and second peak 12/130894 from 22-04 utc. Equipment: TS700 mod., 0.9db, 4cx250b, 17ele. Every sked is very welcome write to: Thorsten Scherf, Luchsstrasse 6, 46535 Dinslaken, ++49206457874 or bbs DH6JT @ DK0MWX or DX-Cluster DH6JT>DB0AMU-9. 73, Thorsten.

### DL1KDA (JO30FQ) wkd on 144MHz (complete QSOs only!):

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 940805 | | | | | | | | | |
| 2200 | 2215 | HG7B/0 | KN17GX | 27 | 27 | 23 | 25 | 3 | c |
| 940807 | | | | | | | | | |
| 0200 | 0245 | 9A4FW | JN95JG | 27 | 27 | 7 | 12 | 4 | c |
| 0500 | 0522 | HG7B/0 | KN18GD | 27 | 28 | 17 | 20 | 3 | c |
| 940809 | | | | | | | | | |
| 1212 | 1245 | EA6/HB9FAP/P | JM29DX | 27 | 28 | 4 | 4 | 22 | c r |
| 940811 | | | | | | | | | |
| 1227 | 1322 | OH8UV | KP34VJ | 26 | 47 | 11 | 15 | 4 | c |
| 2100 | 2120 | YZ7UN | KN05EL | 38 | 27 | 13 | 14 | 6 | c |
| 2200 | 2232 | SM7SJR | JO87FA | 27 | 27 | 6 | 28 | 2 | c |
| 2300 | 2317 | LA/DL9GJW | JP31OB | 36 | 36 | 4 | 8 | 15 | c |
| 940812 | | | | | | | | | |
| 0242 | 0242 | OY/G4WKN | IP61 | 27 | 27 | 1 | - | - | c s r |
| 0700 | 0711 | LA/DF9QT | JP51 | 27 | 27 | m | m | 40 | c s |
| 0848 | 0848 | 9A1KDE | JN95FQ | 39 | 39 | 1 | - | - | c s r |
| 0952 | 1007 | EA4ED | IM79FW | 38 | 27 | 10 | 10 | 9 | c |
| 1037 | 1037 | OY/G4PIQ | IP61 | 27 | 28 | 1 | - | - | c s r |
| 1056 | 1056 | LZ1KWT | KN32? | 38 | 38 | 1 | - | - | c s r |
| 1200 | 1242 | EA3MD | JN02KI | 26 | 26 | 6 | 5 | 3 | c |
| 1347 | 1402 | IT9BLB | JM68KB | 27 | 27 | m | m | 30 | c s r |
| 940813 | | | | | | | | | |
| 0100 | 0125 | OH9NDD | KP26TX | 26 | 26 | 12 | 9 | 5 | c |
| 0416 | 0416 | 9A1CCY | JN85OO | 39 | 27 | 1 | - | - | c s r |
| 2310 | 2335 | UT8AL | KO61WP | 38 | 29 | 10 | 5 | 10 | c r |
| 940814 | | | | | | | | | |
| 1100 | 1142 | OH6AAO | KP14 | 26 | 27 | 4 | 13 | 9 | c |
| 2019 | 2022 | LA/DF9QT | JP30 | 27 | 27 | 3 | 17 | 13 | c s r |
| 940815 | | | | | | | | | |
| 0000 | 0035 | SP9PRO/7 | KO10AT | 27 | 28 | 18 | 23 | 2 | c |

Not Completed QSO's with OH9NYW and LA0BY/p (JP89), but copied LA0BY/p via AuE in QSO with DK9OY, but he didn't rcvd me. NIL: IT9GSF, SP9COO/9, JX7DFA, IW6BLH, EA7DBH, EA9AI, IT9NAN, RZ3QS and LA0BY/P (JP98). This year there were a lot of new squares for me: KN17, KN18, JM29, KP34, JO87, JP31, IP61, JP51, IM79, KN32, JN02, JM68, KP26, KP14, JP30, KO10, JN95 (New WAE: EA6, OY, IT9, LZ). Perhaps somebody can help me with the end letters of some locators... Equipment: Kenwood TS790E, PA 3CX800A7, 2x17ele M2 (2M5WL), PreAmp MGF1302, 15m agl and 460 m asl. My thanks to my friends of the Group: DF7KF, DC9KZ, DL1EAP, DL8EBW, DC6KI and DF2ZC who hold me awake in the nights, hi. And many thanks to Guy, DL8EBW, who made most of the skeds for me! Good DX and see you soon on the band. 73, Alex - DL1KDA (VHF-DX-Group-DL-West).

### DL8EBW (DL66a / JO31NF) wkd on 144MHz:

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 940619 | | | | | | | | | |
| 0500 | 0600 | Z32UC | KN11CR | 1 | 1 | 0.5 | nc | | |
| 940624 | | | | | | | | | |
| 0400 | 0431 | LA4XGA | JP33VC | 27 | 26 | 16 | 34 | 3 | c *1 |
| 940701 | | | | | | | | | |
| 0400 | 0417 | LA4XGA | JP33VC | 27 | 27 | 7 | 27 | 9 | c *1 |
| 940702 | | | | | | | | | |
| 0840 | 0930 | S51AT | JN75GW | 26 | 26 | 12 | 19 | 1 | c |
| 940703 | | | | | | | | | |
| 0400 | 0500 | 9A1CHI | JN95JG | 26 | 26 | 8 | 12 | 1 | nc |
| 940708 | | | | | | | | | |
| 0400 | 0426 | LA4XGA | JP33VC | 27 | 27 | 15 | 27 | 1.5 | c *1 |
| 2300 | 2400 | OH9MTY | KP46BI | 26 | - | 1 | 3 | 0.5 | nc |
| 940709 | | | | | | | | | |
| 2300 | 0100 | OH9MTY | KP46BI | 26 | - | 3 | 7 | 0.5 | nc |
| 940715 | | | | | | | | | |
| 0400 | 0422 | LA4XGA | JP33VC | 28 | 28 | 13 | 23 | 2 | c *1 |
| 940717 | | | | | | | | | |
| 0445 | 0502 | LA/DL5DTA | JP21NV | 26 | 27 | 6 | 8 | 1 | c t |
| 0502 | 0600 | Z32UC | KN11CR | 26 | - | 2 | 6 | 1.5 | nc |
| 940722 | | | | | | | | | |
| 0400 | 0411 | LA4XGA | JP33VC | 27 | 26 | 8 | 9 | 1 | c *1 |
| 940725 | | | | | | | | | |
| 0400 | 0437 | OM9AEM | KN08AJ | 27 | 37 | 16 | 31 | 2 | c |
| 940728 | | | | | | | | | |
| 0200 | 0321 | Z32UC | KN11CR | 26 | 26 | 7 | 8 | 2 | c |
| 940729 | | | | | | | | | |
| 0315 | 0327 | 9A1EZA | JN86HG | 27 | 28 | 7 | 21 | 2 | c |
| 940730 | | | | | | | | | |
| 0400 | 0427 | 9A2KK | JN85KV | 27 | 27 | 6 | 14 | 2 | c |
| 0500 | 0600 | CT/F6EYM | IM57SA | - | - | 1 | 2 | 0.5 | nc |
| 2330 | 2337 | GM4IPK | IO99IK | 27 | 27 | 6 | m | 2 | c |
| 940731 | | | | | | | | | |
| 0850 | 0950 | GET/Bcn | JN01 | 27 | - | 10 | m | 1 | MS-Bcn |
| 940801 | | | | | | | | | |
| 0400 | 0431 | 9A4FW | JN95JG | 26 | 27 | 13 | 28 | 1 | c |
| 940804 | | | | | | | | | |
| 0400 | 0451 | IK0OKY | JN61GT | 26 | 27 | 11 | 12 | 0.5 | c |
| 2300 | 2400 | OH9NYW | KP25GR | 26 | 26 | 5 | 5 | 2 | nc |
| 940805 | | | | | | | | | |
| 0000 | 0011 | HG7B/0 | KN17 | 28 | 26 | 6 | 17 | 1 | c |
| 2300 | 2400 | OH9NYW | KP25GR | - | - | - | 5 | - | nc |
| 940806 | | | | | | | | | |
| 2248 | 2326 | HG7B/0 | KN18GD | 28 | 27 | 16 | 20 | 1 | c |
| 940807 | | | | | | | | | |
| 2300 | 2346 | 9A4EW | JN95JG | 26 | 27 | 8 | 14 | 1 | c |
| 940808 | | | | | | | | | |
| 0000 | 0016 | HA8CE | KN06EN | 28 | 26 | 11 | 20 | 2 | c |
| 940811 | | | | | | | | | |
| 0200 | 0330 | OH8MSM | KP44FC | 36 | 27 | 3 | 13 | 6 | nc 100lpm |
| 0425 | 0442 | LZ1KWT | KN32PG | 27 | 27 | 15 | 20 | 4 | c r |
| 2345 | | OY/G4PIQ | IP61 | 27 | 27 | m | m | 2 | nc r |
| 940812 | | | | | | | | | |
| 0000 | 0100 | LA0BY/P | JP89KB | 26 | - | 4 | 8 | 14 | nc |
| 0107 | | OY/G4WKN | IP61 | 38 | 38 | 1 | - | 20 | c r |
| 0200 | 0222 | LA/DL9GJW | JP31QB | 37 | 37 | 7 | 14 | 15 | c |
| 0400 | 0416 | LA4XGA | JP33VC | 37 | 47 | 7 | 19 | 8 | c *1 |
| 0711 | | LA/DF9QT | JP51HE | 27 | 27 | 1 | - | 20 | c |
| 0800 | 0900 | EA9AI | IM75IV | 27 | - | 3 | 3 | 1.5 | nc |
| 0900 | 0916 | EA4ED | IM79FW | 47 | 48 | 10 | 25 | 35 | c |
| 0934 | | SM3BEI | JP81 | 29 | 27 | 1 | - | 30 | c r |
| 0951 | | ES2RJ | KO29 | 37 | 27 | 1 | - | 25 | c |
| 0957 | | GET/Bcn | JN01 | 38 | - | 1 | - | 15 | c bcn |
| 1200 | 1230 | US1VQ | KN58XA | 26 | - | 3 | 4 | 0.7 | nc |
| 2200 | 2231 | SP9PRO7 | KO10AT | 26 | 26 | 14 | 17 | 4 | c |
| 940813 | | | | | | | | | |
| 0000 | 0100 | US1VQ | KN58XA | 26 | - | 1 | 2 | 0.5 | nc |
| 0119 | | OY/G4WKN | IP61 | 38 | 38 | 1 | - | 20 | c r |
| 0151 | | HA3UU | JN96JO | 38 | 39 | 1 | - | 35 | c r |
| 0600 | 0700 | EA9AI | IM75IV | 26 | - | 2 | 3 | 0.5 | nc |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0720 0741 | EA3MD | JN02KI | 26 | 26 | 16 | 17 | 0.5 | c |
| 0847 0920 | LA/DF9QT | JP41 | 27 | 27 | 12 | m | 12 | c r |
| 940814 | | | | | | | | |
| 0116 0128 | LZ2UU | KN12QP | 27 | 37 | 6 | 4 | 3 | c |
| 0400 0426 | OH6AAO | KP14 | 27 | 37 | 7 | 11 | 7 | c |
| 1000 1100 | EA9AI | IM75IV | 26 | - | 1 | 3 | 0.5 | nc |
| 940815 | | | | | | | | |
| 2143 2300 | LA/DF9QT | JP30 | 27 | 26 | 11 | m | 1 | nc ssb *2 |
| 940819 | | | | | | | | |
| 0400 0423 | LA4XGA | JP33VC | 26 | 26 | 12 | 31 | 1 | c *1 |
| 940826 | | | | | | | | |
| 0400 0422 | LA4XGA | JP33VC | 26 | 27 | 12 | 27 | 3 | c *1 |
| 940902 | | | | | | | | |
| 0400 0422 | LA4XGA | JP33VC | 26 | 27 | 12 | 35 | 7 | c *1 |
| 2300 2400 | I1DMP | JN35UB | 27 | 27 | 7 | 21 | 1 | nc |
| 940909 | | | | | | | | |
| 0400 0421 | LA4XGA | JP33VC | 27 | 27 | 10 | 27 | 0.5 | c *1 |
| 940916 | | | | | | | | |
| 0400 0417 | LA4XGA | JP33VC | 27 | 27 | 10 | 22 | 0.5 | c *1 |
| 941002 | | | | | | | | |
| 0000 0100 | I1DMP | JN35UB | 26 | - | 9 | 20 | 0.5 | nc |
| 941002 | | | | | | | | |
| 1838 1850 | JX7DFA | IQ50OV | 26 | - | - | 2 | - | nc bcn |
| 941009 | | | | | | | | |
| 0451 SANDRA has been born! My best DX so far , hi !!! | | | | | | | | |
| 941016 | | | | | | | | |
| 0000 0200 | OH9MTY | KP46BI | 26 | - | 2 | 2 | 0.5 | nc |
| 941018 | | | | | | | | |
| 0000 0041 | OH5IY | KP30HV | 27 | 26 | 17 | 41 | 15 | c |
| 0100 0200 | EA9AI | IM75IV | - | - | 1 | 3 | 0.3 | nc |
| 0510 0600 | JX7DFA | IQ50OV | - | - | - | 3 | - | nc *3 |
| 941019 | | | | | | | | |
| 0200 0300 | CT1DYX | IN51PF | 26 | 26 | 6 | 6 | 2 | nc s |
| 941020 | | | | | | | | |
| 0500 0600 | EA3FLN | JN12KA | 27 | 26 | 24 | 61 | 5 | nc *4 |
| 941021 | | | | | | | | |
| 0000 0048 | OH5IY | KP30HV | 26 | 26 | 9 | 49 | 0.5 | c |
| 0100 0200 | EA9AI | IM75IV | 26 | - | 1 | 4 | 0.3 | nc |
| 0500 0545 | LA4XGA | JP33VC | 27 | 28 | 10 | 29 | 1 | c *1 |
| 941028 | | | | | | | | |
| 0500 0551 | LA4XGA | JP33VC | 26 | 27 | 17 | 47 | 2 | c *1 |

Remarks: *1 Regular sked with Geir (1320km), to test MS-condx. *2 Appologize to DF6NA: You had a better position, but HE was always calling ME and the signals were too bad on my side - I was only waiting for the final rogers! *3 2330km! *4 Jordi had got terrible QRN - Orionids were quite good this sked!

Remarks on Perseids: Between 11.Aug 22 UTC to 12.Aug 08 UTC the conditions were very poor! The 1st maximum seems to be on 12.Aug 09-11 UTC. A lot of good reflections also on random. A second peak was around 22 UTC to 04UTC on 13.Aug. At all, it was not as good as the last 2 years !!

Hrd random (>30sec): 9A1CCY, 9A1KDE, EU6MS, HA3UU, HA5KDQ, EB1BNH, LZ1KWT, EA3BTZ; EA4ED, SM3BEI, G8XVJ, IT9BLB, TK5EP and others...

NIL: 09.07 IV3HWT; 12.07 SVDC3QB; 29.07 9A4EW; 11.08 SP9COO; 12.08 YO5BWD, UR5M (2200km), RU3ZD (2100km) and JX7DFA (2300km); 13.08 9A1CDD; 14.08 IC8FAX; 18.08 IK0BZY/8; 27.08 OE/PA3EFC/p and 27.08 DL9GJW Sidescatter; 18.09 SK0AR; 25.09 S53VV (Sri, I missed to change the clock!). Thanks for info, Guido.

### DL9NDA/p (FK69b/JO50VF) wkd on 144 MHz:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940809 | | | | | | | | |
| 0600 0700 | EA6/HB9FAP/p | JM29DX | | | | | | nil |
| 0700 0745 | IC8FAX | JN70CN | 27 | 27 | 10 | 25 | 4 | c |
| 940811 | | | | | | | | |
| 0930 0938 | EA4LY | IN80CJ | 26 | 27 | 3 | 6 | 4 | c s r |
| 2322 2340 | UT8AL | KO61WP | 27 | 27 | 4 | 4 | 2 | c r |
| 940812 | | | | | | | | |
| 0300 0320 | OH9NDD | KP26TM | 27 | 26 | 8 | 9 | 4 | c |
| 0337 0400 | UT7GA | KN56 | 27 | 27 | 12 | m | 6 | c r |
| 1900 2000 | UA4AQL | LO20QB | 26 | 27 | 3 | 4 | 1 | nc *1 |
| 2000 2040 | UA3T | LO16XG | 26 | 27 | 11 | 9 | 4 | c *2 |
| 2208 | UA3XFA | KO73 | 48 | 59 | 1 | - | 22 | c s r |
| 940813 | | | | | | | | |
| 0100 0122 | RZ3QS | KO91 | 27 | 28 | 4 | 13 | 2 | c |
| 0246 0300 | IT9BLB | JM68KB | 26 | 27 | 2 | 3 | 3 | c |

Remarks: *1 Missing final rogers! *2 2220 km! Comments: In my opinion the Perseid-shower was not as rich as in the past 2 years. Nevertheless it was again a great pleasure working MS. The longest burst I could hear was UT8AL with CQ in CW-RND, lasting 80 sec. Mni tnx fr all QSOs; hope to meet you during the next showers. 73 es good DX, Frank.

### EA4ED (IM79) wkd on 144MHz:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940810 | | | | | | | | |
| 1030 | IK1EGC | JN35 | 26 | 26 | - | - | - | c |
| 1130 | I4YNO | JN54KP | 26 | 27 | - | - | - | c |
| 940811 | | | | | | | | |
| 0600 | F6CTW | JN18CS | 26 | 27 | 16 | 30 | 8 | c |
| 0600 | F5HRY | JN18EQ | 26 | 38 | 15 | 25 | 12 | c |
| 0630 | DK2PH | JO41GV | 26 | 26 | 7 | 15 | 3 | c |
| 0724 | IW5AVM | JN52NS | 27 | 26 | - | - | - | c s |
| 0800 | IK5QLO | JN53GX | 26 | 27 | 1 | - | 8 | c s |
| 0930 | DL6YCY | JO41CU | 26 | 37 | 10 | 17 | 2 | c |
| 1000 | DK4TG | JO31FF | 27 | 27 | 14 | 23 | - | c |
| 1000 | PA3BZO | JO21RS | 26 | 27 | - | - | 5 | c |
| 1030 | IK1JXY | JN44VC | 26 | 27 | 10 | 21 | - | c |
| 1030 | HA7UL | JN97OG | 27 | 26 | 7 | 15 | - | nc *1 |
| 1100 | HA3UU | JN96JO | 36 | 26 | 3 | 7 | 3 | nc *2 |
| 2300 | G3IMV | IO91OX | 27 | 27 | 12 | 17 | 7 | c |
| 2300 | G3WZT | IO90UX | 26 | 27 | - | - | 10 | c |
| 2320 | G4YTL | IO92MB | 38 | 27 | - | - | - | c |

NIL: SP9EWU (2237km), IK1IXI (ssb), DL9NDD, DK0OG, HA7PL (2141km). Remarks: *1 2141km, *2 2094km

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940812 | | | | | | | | |
| 0000 | G0GMS | IO91UB | 26 | 37 | - | - | 2 | c |
| 0030 | G0KAS | IO91UI | 26 | 37 | - | - | 40 | c S9! |
| 0054 | G4FUF | JO01 | 39 | 39 | - | - | - | c s r |
| 0054 | G4EZP | JO01GN | 39 | 39 | - | - | - | c s r |
| 0100 | GM4YXI | IO87WI | 26 | - | 4 | 10 | - | nc |
| 0135 | G0LBK | IO93JK | 36 | 27 | - | - | - | c |
| 0200 | EI4DQ | IO51WI | 26 | 38 | 8 | 15 | 5 | c |
| 0300 | DF8LC | JO53GX | 38 | 27 | - | - | 15 | nc |
| 0300 | DK9OY | JO52AK | 26 | 37 | 10 | 17 | - | c |
| 0400 | DL2EAA | JO31KL | 36 | 26 | 4 | 7 | 10 | nc |
| 0440 | IN3KLQ | JN56RG | 36 | 27 | - | - | - | c r |
| 0500 | DF5BN | JN49GU | 26 | 26 | - | - | 25 | c S9! |
| 0530 | DL3IAE | JN49DE | 26 | 37 | - | - | 10 | c |
| 0600 | DL2IAN | | 26 | 26 | - | - | 20 | c |
| 0600 | PA3BIY | JO22EB | 26 | 38 | - | - | - | c |
| 0625 | PA3BZL | JO22SA | 26 | 38 | - | - | - | c |
| 0630 | DF6NA | JN49XS | 26 | 27 | - | - | 6 | c |
| 0645 | G0CUZ | IO82WM | 36 | 37 | - | - | - | c r |
| 0700 | PA2TAB | JO32GF | 36 | 28 | - | - | 7 | c |
| 0700 | DL8LAQ | JO43XU | 26 | 26 | - | - | - | c |
| 0730 | ON4QQ | JO20FS | 26 | 27 | - | - | 25 | c S9! |
| 0800 | S51AT | JN75GW | 27 | 27 | - | - | - | nc |
| 0800 | IV3HWT | JN65ST | 46 | 26 | - | - | - | c |
| 0830 | S57EA | JN76HE | 36 | 27 | - | - | - | c |
| 0900 | DL8EBW | JO31NF | 47 | 48 | - | - | - | c ufb! |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0900 | DL3YEL | JO41EV | 47 | 27 | - | - | 50 | c |
| 0920 | DL1EAP | JO31IK | 36 | 37 | - | - | - | c |
| 0930 | DL9YEY | JO41GV | 49 | 37 | - | - | 120 | c S9! |
| 0944 | DF8LC | JO53GX | 37 | 37 | - | - | - | c s r |
| 0955 | DL1KDA | JO30FQ | 27 | 38 | - | - | - | c |
| 1000 | DL3BWW | JO72GI | 38 | 27 | - | - | 15 | c *1 |
| 1025 | ON1SN | | 37 | 37 | - | - | - | c s r |
| 1025 | DK9TF | | 37 | 37 | - | - | - | c s r |
| 1026 | DB4VQ | | 27 | 27 | - | - | - | c s r |
| 1026 | F6FLV | | 39 | 39 | - | - | - | c s r |
| 1030 | DL7KF | JO30GU | 38 | 27 | - | - | - | c |
| 1035 | PA0JMV | JO21PM | 59 | 59 | - | - | - | c s r |
| 1035 | DL2CI | | 37 | 37 | - | - | - | c s r |
| 1035 | PA3FJY | JO32EH | 39 | 39 | - | - | - | c s r |
| 1035 | ON4GG | JO20AR | 39 | 39 | - | - | - | c s r |
| 1036 | DH8NAA | | 39 | 39 | - | - | - | c s r |
| 1038 | PA3EFC | JO21NW | 39 | 27 | - | - | - | c s r |
| 1040 | PE1BVM | JO21 | 36 | 27 | - | - | - | c s r |
| 1042 | OZ1FTN | | 39 | 39 | - | - | - | c s r *2 |
| 1042 | ON1AEN | JO10 | 36 | 36 | - | - | - | c s r |
| 1044 | DK1KO | JO52CK | 39 | 39 | - | - | - | c s r |
| 1045 | PA3FJY | JO32EH | 39 | 37 | - | - | - | c s r |
| 1046 | DF6NA | JN49XS | 59 | 59 | - | - | - | c s r |
| 1058 | G0JUR | IO92WT | 39 | 39 | - | - | - | c s r |
| 1058 | DG9NBT | JN49WS | 36 | 27 | - | - | - | c s r |
| 1115 | DC6KI | JO30 | 37 | 37 | - | - | - | c s |
| 1120 | DC9KZ | JO30 | 37 | 37 | - | - | - | c s |
| 1140 | DL3BWW | JO72GI | 38 | 38 | - | - | - | c s r *3 |
| 1142 | PA3ABY | | 29 | 29 | - | - | - | c s r |
| 1145 | DG9NBT | JN49WS | 38 | 38 | - | - | - | c s r |
| 1148 | OK1UBR | | 27 | 27 | - | - | - | c s r |
| 1200 | DG5NEX | JN49WS | 36 | 28 | - | - | - | c s |
| 1242 | ON4AMX | | 37 | 37 | - | - | - | c s r |
| 1250 | DJ5BV | | 37 | 37 | - | - | - | c s r |
| 1300 | 9A1CCY | JN85OO | 26 | 27 | - | - | - | c s |
| 1300 | I4XCC | JN63GV | 28 | 27 | - | - | - | c |

NIL: DL5GAC, DF1SO, S57TW and G1HWY (ssb). Remarks: *1 2060km S9! *2 2242km *3 2060km.

940813

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0530 | DH6JT | JO31JO | 26 | 26 | - | - | - | c |
| 0600 | IW2BNA | JN54ON | 27 | 26 | - | - | - | c |
| 0617 | I5YDI | | 27 | 28 | - | - | - | nc r |
| 0630 | IW1AZJ | JN35UB | 36 | 37 | - | - | - | c |
| 0655 | DF1SO | JN48PO | 27 | 27 | - | - | - | nc r |
| 0700 | DH6JL | JO31MF | 26 | 26 | - | - | - | c |
| 0705 | TK5EP | | 36 | 36 | - | - | - | c r |
| 0745 | DL5BCU | | 27 | 26 | - | - | - | nc r |
| 0800 | PA3FJY | JO32EH | 37 | 37 | - | - | - | nc r |
| 0800 | PA3FOC | JO21FW | 26 | 28 | - | - | 10 | c |
| 0830 | F6BSJ | | 27 | 27 | - | - | - | c s |
| 0830 | PE1OGF | JO21QJ | 26 | 27 | - | - | - | c s |
| 0850 | G0KAS | IO91UI | 27 | 27 | - | - | - | nc r |
| 0910 | F8OP | | 28 | 28 | - | - | - | c r |
| 1000 | ON4KHG | JO10WK | 26 | 37 | - | - | - | c |
| 1030 | DJ3MY | JN58QD | 38 | 27 | - | - | - | c |
| 1200 | DF1SO | JN48PO | 27 | 27 | - | - | - | c r |

NIL: PA3EPD, DL3MGL, DK8LV and SP2OFW (2323km).

This was the activity from EA4ED during de last Perseids. Thank's to everybody for his contribution to give us a beautiful DX expedition. I hope that we have no errors on the list, especilly on random QSO's. QSL card is OK via EA4ED or myself. 73 and good DX.

### EA9AI (IM75IV) wkd on 144MHz during the Perseids:

940811

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0700 | 0800 | HB9CRQ | JN47CF | 26 | 26 | 5 | 23 | - | nc |
| 0900 | 1000 | DL1MAJ | JN68AH | 26 | 26 | 6 | 12 | - | nc |

NIL: IK2VFR, S57TW, 9A4EW, IK1EGC

940812

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0700 | 0800 | DF5BN | JN49GU | 26 | 26 | 12 | 4 | - | c *1 |
| 0900 | 1000 | DL3IAE | JN49DE | 26 | 26 | 7 | 6 | 7 | c |
| 1000 | 1100 | IK2DDR | JN55GN | 26 | 36 | 9 | 4 | 8 | c |
| 1100 | 1200 | DL1EAP | JO31IK | 26 | 26 | 5 | 2 | 6 | c |

NIL: DL8EBW, DL2IAN and DL1KDA.

940813

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0700 | 0800 | IK1JXY | JN44WC | 26 | 27 | 8 | 3 | 4 | c |
| 0900 | 1000 | DF7KF | JO30GU | 26 | 26 | 4 | 5 | 3 | c *2 |
| 1100 | 1200 | HB9CRQ | JN47CF | 26 | 26 | 5 | 16 | 6 | c |

NIL: DL8EBW, DF6NA, DL3BWW, S51AT, PA3EPD and PA2GER.

940814

NIL: DL8EBW

Remarks: *1 Max. S8 - 1st MS-QSO!!!; *2 Max. S7!

Comments: My special congratulation to HB9CRQ. He obtained the DXCC 100 VHF with my QSO! Many thanks to all and special thanks to DF5BN, Walter, who is the first I worked via MS. For sked proposals, informations or remarks write to: Francisco Javier Alvarez Segura, Avda Ejercito Español, Torreón B1, E-11702 CEUTA or Packet Radio EA9AI @ ZB2BL.#GIB.GIB.EU. Phone ++956 503911. 73, Javi. Many thanks for info, Javir.

### F5HRY (JN18EQ / BI22c) wkd on 144MHz:

940811

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0600 0620 | EA4ED | XZ | 38 | 26 | - | - | - | c |

940812

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0350 0405 | EA6/HB9FAP | BA | 37 | 38 | - | - | - | c r |
| 0358 | OY/G4PIQ | WV | 27 | 28 | - | - | - | c s r |
| 0410 | S51AT | | - | 37 | - | - | - | nc? |
| 0600 0610 | SM7SJR | IR | 36 | 38 | - | - | - | c |
| 0927 | YU1VG | ?? | 37 | 37 | - | - | - | c s r |
| 0927 | HA3UU | JH | 29 | 37 | - | - | - | c s r |
| 1237 | SM7TUG | ?? | 29 | 29 | - | - | - | c s r |
| 1248 | SM3BEI | IV | 28 | 28 | - | - | - | c s r |

Equipment: 4x11ele, 1kW, 0.5 dB NF. My address: Herve Biraud, 37 Rue Pierre Brossolette, 91600 Savigny Sur Orge. Phone: ++33-1-69966879. 73 and cu soon on the air, Herve.

### I4XCC (JN63GV) wkd on 144MHz:

940728

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1000 | ES5WE/0 | KO07XX | 27 | 27 | - | - | - | c |

940729

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2200 | RU1A | KO48VR | 27 | 27 | - | - | - | c |

940731

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0400 | LA2PHA | JO38IB | 27 | 27 | - | - | - | c s |
| 0600 | DL9GJW | JO54WC | 27 | 27 | - | - | - | c |

940810

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2000 | SP9PRO/7 | KO10AT | 27 | 27 | - | - | - | c |

940811

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0900 | UR5M | KN99FD | 27 | 28 | - | - | - | c |
| 1900 | G1HWY | IO91UV | 27 | 28 | - | - | - | c s |
| 2300 | LA8KV | JP52QQ | 27 | 26 | - | - | - | c |

940812

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0100 | SM7SJR | JO87FA | 27 | 27 | - | - | - | c |
| 1300 | EA4ED | IM79FV | 27 | 27 | - | - | - | c |
| 2007 | OZ1BEF | JO46AE | 27 | 27 | - | - | - | c s |
| 2100 | 9H1PA | JM75FV | 27 | 26 | - | - | - | c s |

940813

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0001 | EA5IC | IM98VX | 37 | 37 | - | - | - | c |

940813

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0323 | G0JUR | | 38 | 38 | - | - | - | c s |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940813 | | | | | | | | |
| 1000 | CT1WW | IN61GE | 37 | 26 | - | - | - | c |

Remarks: *1 2061km *2 2093km

**I4YNO (JN54KP) wkd on 144MHz:**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940326 | | | | | | | | |
| 0500 0600 | DL9GJW | JO54 | 26 | - | 7 | 15 | 1 | nc |
| 940403 | | | | | | | | |
| 0400 0445 | DL9GJW | JO54 | 37 | 26 | 5 | 14 | 45 | c |
| 940526 | | | | | | | | |
| 0400 0500 | SV/DL5MAE | KM46 | 27 | 26 | 2 | - | 1 | nc |
| 940604 | | | | | | | | |
| 0400 0425 | SV/DL5MAE | KM46 | 27 | 26 | m | m | 1.5 | c |
| 940703 | | | | | | | | |
| 0300 0400 | Z32UC | KN11 | - | - | - | 1 | - | nc |
| 940710 | | | | | | | | |
| 0800 0900 | DH6JT | JO31 | 26 | - | 1 | 4 | 1 | nc |
| 940724 | | | | | | | | |
| 0330 0425 | DL9YEY | JO41 | 27 | 27 | 10 | m | 1 | c |
| 940808 | | | | | | | | |
| 0400 0450 | ON1ALJ | JO10 | 27 | 26 | 2 | 22 | - | c s |
| 940810 | | | | | | | | |
| 0300 0357 | G4MKF | IO91 | 27 | 26 | 19 | m | 3 | c |
| 0400 0455 | SM7TUG | JO76 | 37 | 28 | 3 | 10 | - | c s |
| 1130 1152 | EA4ED | IM79 | 27 | 26 | 10 | 16 | 5 | c |
| 2200 2225 | UT7GB | KN56 | 37 | 27 | 8 | m | 4 | c |
| 940812 | | | | | | | | |
| 1230 1302 | OZ5QF | JO45 | 26 | 37 | 13 | m | 15 | c |
| 1330 1400 | US5CCO | KN59 | 27 | 26 | 2 | 4 | - | nc |
| 2316 2318 | G8TIC/p | IO84 | 39 | 38 | 3 | - | - | c s r |
| 940813 | | | | | | | | |
| 0005 0006 | G0LBK | | 38 | 28 | 1 | - | - | c s r |
| 0352 | DL9USA | | 37 | 38 | 1 | - | - | c s r |
| 0352 | OZ1BVW | | 38 | 38 | 1 | - | - | c s r |
| 0352 0355 | PA2DWH | JO22 | 27 | 27 | 3 | - | - | c s r |
| 0356 | PA3AJG | | 38 | 37 | 1 | - | - | c s r |
| 0356 | PE1IKX | JO22 | 26 | 26 | 1 | - | - | c s r |
| 0356 | PA3FOC | JO21 | 28 | 27 | 1 | - | - | c s r |
| 0356 | G0CUZ | IO82 | 26 | 26 | 1 | - | - | c s r |
| 0402 | DL6LAU | JO54 | 59 | 59 | 1 | - | - | c s r |
| 1320 1355 | DL3YEL | JO41 | 27 | 37 | 5 | mn | 3 | c |

NIL: 940611 GU/DC9KZ sri, overslept!; 940724 es 940728 SP2OFW; 940811 LZ1ZP other QSO on same QRG, PE1IKX local QRM from FM broadcasting in this direction above 144.350! sri, ES5RY, UR5M; 940811 RU1A; 940813 SP2OFW.

I am fully QRV again after 3 and a half years of QRT. My working conditions are: TS-850S + LT2S xvert. or FT-736 + MuTek board, 3CX800A7 PA, MGF1302 or BF988 preamp (depends which one is not burned at that time, hi), 17ele F9FT (but soon 20ele Shark) with 50m of H100 coax (soon will be replaced by CELLFLEX 1/2"), ETM9-C memory keyer and Philips cassette recorder (up to 1000lpm on RX). For those who are still missing JN54, please contact me at the following telephone number: ++39-59-236243 after 18.30 UTC or via Callbook address. 73, Alex.

**IK0IXI (JN52VC / FC79b) wkd on 144MHz:**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940812 | | | | | | | | |
| 0400 0425 | ON1IM | | 27 | 27 | 1 | m | 6 | c |
| 0500 0519 | DK9OY | JO52 | 27 | 27 | 1 | 4 | 20 | c |
| 0600 0614 | HA8CE | | 27 | 27 | 2 | 2 | 12 | c |
| 1312 | DK2PH | | 27 | 27 | 1 | - | 5 | c s r |
| 940813 | | | | | | | | |
| 0700 0721 | ON1ALJ | | 27 | 26 | 1 | 4 | 11 | c |

NIL or NC: DL9GJW, DL9YEY, DL3BWW, DD0VF, DK0UB, PA2TAB, PA0NF, ON4AMX, PA3EFC, OZ5QF, GW4VVX, GM4VVX, GW4UWR, GW0PZT and PE1IKX. Equipment: 2x17el, 300W es GaAsFet-preamp. Thanks for info, Fabio.

**IT9BLB/p (JM68KB) wkd on 144MHz:**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940812 | | | | | | | | |
| 0152 0238 | DL9YEY | JO41 | 37 | 37 | 12 | 47 | 12 | c |
| 0351 0409 | DG3FK | | 27 | 27 | 8 | 60 | 4 | c |
| 0425 0434 | DG5FAA | | 28 | 28 | 9 | 7 | 5 | c |
| 1313 | DK2PH | | 27 | 27 | 1 | | 12 | c |
| 1321 1336 | DC9KZ | JO30 | 27 | 27 | 6 | 28 | 3 | c |
| 1351 1402 | DL1KDA | JO30 | 27 | 27 | 9 | 26 | 3 | c |
| 1445 1456 | DF7KF | JO30 | 26 | 26 | 8 | 18 | 5 | c |
| 940813 | | | | | | | | |
| 0125 0136 | DF7ZC | | 27 | 27 | 6 | 14 | 3 | c |
| 0146 0155 | HB9BQU | | 27 | 27 | 4 | 6 | 6 | c |
| 0156 0208 | PA3FOC | | 27 | 27 | 9 | 19 | 8 | c |
| 0216 0224 | DL3LBK | | 27 | 27 | 9 | 18 | 12 | c |
| 0246 0253 | DB5ML | | 37 | 37 | 18 | 22 | 18 | c |
| 0249 0258 | DL9NDA | JO50 | 26 | 26 | 22 | 27 | 14 | c |
| 0315 0315 | F8CS | JN27 | 37 | 37 | 1 | | 10 | c |
| 0316 0316 | DL9USA | JO71 | 37 | 37 | 1 | | 12 | c S9+ |
| 0347 0349 | OK2PVF | | 27 | 27 | 2 | | 25 | c |
| 0349 0349 | DD6GI | | 37 | 37 | 1 | | 22 | c |
| 0417 0417 | DG1VL | JO61 | 39 | 39 | 1 | | 20 | c S9+ |
| 0429 0429 | PA3FOC | JO21 | 37 | 37 | 1 | | 12 | c |
| 0435 0438 | HA3UU | | 39 | 39 | 2 | | 15 | c |
| 0439 0439 | HA5CW | | 37 | 37 | 1 | | 10 | c |
| 0503 0503 | HA2NP | | 39 | 39 | 1 | | 8 | c |
| 0507 0507 | SP1F?? | | 39 | 39 | 1 | | 4 | nc qrm |
| 0553 0553 | HA3UU | | 39 | 39 | 1 | | 8 | c |
| 940814 | | | | | | | | |
| 0111 0111 | F6FLV | | 27 | 27 | 1 | | 22 | c S9+ |

Equipment: FT-225RD, preamp CF-300, 15ele CueDee. I remained fully active on 144.200 till 05.30Z receiving only some pings or very short burts: Perseids had "stopped"? That's all from my holidays MS activity. See you next year. I'm very interested to know all missing locators, pse mail to IT9BLB @ IT9XSX.ISIC.ITA. 73 and good DX, Giuseppe (Joe).

**JX7DFA (IQ50OV) wkd on 144MHz:**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940809 | | | | | | | | |
| 1800 1810 | LA8KV | JP52QQ | 49 | 27 | 6 | 8 | 20 | c |
| 1825 | ON4GG | JO20AR | | | 1 | | 7 | hrd *1 |
| 1830 2000 | ON4ANT | JO20 | 26 | ?6 | 5 | 9 | 0.3 | nc *1 |
| 940810 | | | | | | | | |
| 2000 2055 | LA/DL9GJW/p | JP31OB | 26 | rr | 6 | 8 | 0.5 | nc |
| 940811 | | | | | | | | |
| 2100 2145 | DL3BWW | JO72GI | 26 | | 1 | 1 | 0.5 | nc *2 |
| 2200 2218 | OZ1DOQ | JO64GX | 28 | 28 | 5 | 7 | 3 | c *3 |
| 2247 2255 | SM6CMU | JO57XK | 37 | 38 | 6 | 4 | 12 | c r |
| 2300 2345 | PA3FOC | JO21FW | 26 | 27 | 3 | 12 | 5 | c *4 |
| 940812 | | | | | | | | |
| 0000 0110 | PA3BIY | JO22FA | 26 | 26 | 3 | 7 | 4 | nc *5 |
| 0900 1002 | EI4DQ | IO51WU | 37 | 26 | 4 | 13 | 10 | nc *6 |
| 1015 1105 | G3IMV | IO91OX | 26 | | 3 | 4 | 1 | nc *7 |
| 1105 1137 | G0CUZ | IO82WM | 36 | 26 | 8 | 20 | 7 | c *8 |
| 1140 1240 | G4FUF | JO01GN | 26 | | 3 | 11 | 0.2 | nc *9 |
| 1300 1402 | JW/DK8ZJ/p | JQ78 | 27 | 27 | 9 | m | 10 | nc *10 |
| 1409 1415 | LA2PHA | JO38IB | 26 | 26 | 2 | 2 | 15 | c s |
| 1632 1653 | SM2CEW | KP15CR | 27 | 27 | 10 | m | 30 | c s |
| 1200 1305 | GM0EWX | IO67UL | 26 | 26 | 12 | m | 8 | nc |
| 2100 2157 | ON4ANT | JO20 | 26 | | 1 | 5 | 0.1 | nc *1 |
| 2200 2255 | ON4GG | JO20AR | 26 | ?6 | 2 | 9 | 0.4 | nc *1 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 2320 2344 | SM6KJX | JO67CK | 37 | 27 | 12 | 10 | 30 | c r |

940813

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0000 0023 | DF8LC | JO53GX | 26 | 27 | 5 | 11 | 6 | c *11 |
| 0200 0220 | DL6LAU | JO54CJ | 26 | 26 | 9 | 27 | 20 | c *12 |

940814

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0000 0110 | PA3BIY | JO22FA | | | 1 | 11 | 0.1 | nc *5 |
| 1000 1050 | GM4CXM | IO75TW | 26 | 26 | 14 | 143 | 4 | c |
| 1100 1145 | G3IMV | IO91OX | 26 | | 1 | 1 | 0.3 | nc *7 |
| 1200 1305 | GM0EWX | IO67UL | 26 | 37 | 14 | 70 | 5* | c *13 |
| 2100 2124 | G4KUX | IO94BO | 26 | 27 | 9 | 19 | 3 | c |

Remarks: *1 2337km, *2 2368km, *3 2048km, *4 2211km, *5 2202km, *6 2118km, *7 2142km, *8 2071km, *9 2201km, *10 350lpm, *11 2106km, *12 2055km, *13 60sec Au-E.

Equipment: 13ele Yagi homenrew (K1FO-design) + preamp MGF1302 (0.29dB NF) + PA 2x4CX250B + speed 1200lpm.

The QSO with PA3FOC ist the 1st contact between PA-JX on 144MHz and my ODX!

I could not keep all skedtimes due to problems with high swr (Sleet & violent storm caused this). Sunday the 14th it was auroral activity, I worked LA4XGA on AuE, and heard SK4MPI for 90 minutes (1330-1500UTC) - 1500km the Aurora normally shortens all reflections, as you clearly can see in the GM4CXM/GM0EWX QSO. I think it will be easy working SCA + GM on AE in the future with my new 4 Yagi array. Special greetings to OH5IY + OH7MA (I did not manage to be on due to WX...sri). 73, Per (JX7DFA @ LA6K.KSU.T.NOR.EU).

## MS from the northern part of Norway

### LA0BY/p in JP89KB wkd on 144 MHz:

940809

NIL: DL3DTS

940810

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0500 0600 | DL3LBK | JO54 | 27 | 27 | 9 | 5 | 5 | c |
| 0600 0620 | OH5IY/4 | KP31 | 27 | 27 | 7 | 11 | 4 | c |
| 0640 0700 | OH2TI | KP20 | 27 | 27 | 5 | 10 | 4 | c r |
| 0700 0730 | OH7PI | KP32 | 27 | 27 | 6 | 7 | 7 | c |
| 0730 0755 | OH2BNH | KP20 | 27 | 27 | 5 | 4 | 5 | c r |
| 0800 0825 | DL6LAU | JO54 | 27 | 26 | 4 | 7 | 40 | c |
| 0900 0945 | DL5DTA | JO61 | 26 | - | - | 4 | - | nc |
| 1300 1335 | LA4XGA | JP33 | 37 | 26 | 5 | 10 | 10 | c |
| 1335 1415 | LA8KV | JP52 | 37 | 27 | 9 | 9 | 10 | c |
| 1415 1505 | PA3FBN | JO33 | 27 | 27 | 9 | 9 | 10 | c |
| 1825 1905 | OH2BAP | KP20 | 27 | 27 | 5 | 10 | 5 | c r |
| 1905 1930 | RU1AA | KO59 | 27 | 27 | 1 | - | 2 | nc *1 |
| 2030 2100 | OH7MA | KP52 | 27 | 26 | 5 | 6 | 7 | c |
| 2100 2120 | OZ1DOQ | JO65 | 26 | 27 | 6 | 13 | 1 | c |
| 2120 2145 | OZ1FTU | JO65 | 26 | 26 | 8 | 15 | 2 | c |
| 2145 2210 | SM7SCJ | JO65 | 36 | 27 | 9 | 8 | 10 | c r |
| 2300 2355 | PA3DWH | JO22 | 26 | - | 1 | 5 | - | nc |

NIL: DL4EA, LA/DL9GJW/p, G0CUZ, SP2OFW and DL4DTU.

940811

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0000 0100 | PA3BIY | JO22 | 26 | 26 | 5 | 4 | 2 | c |
| 0100 0140 | PA2TAB | JO32 | 36 | 26 | 4 | 3 | 20 | c |
| 0600 0645 | UA3T | LO16 | 26 | - | - | 2 | - | nc |
| 0800 0910 | DL1EAP | JO31 | 26 | 26 | 3 | 8 | 1 | c |
| 1100 1215 | ON4ANT | JO20 | 26 | 27 | 7 | 11 | 4 | nc |
| 2000 2100 | DF0CI | JO51 | 26 | 26 | 3 | 4 | - | nc |
| 2100 2210 | UA3T | LO16 | 27 | 27 | 6 | 4 | 3 | nc |
| 2210 2240 | DK2PH | JO41 | 27 | 26 | 2 | 3 | 2 | c |
| 2240 2255 | SM3BEI | JP81 | 38 | 37 | 2 | 1 | 20 | c r |
| 2300 2355 | DF7KF | JO30 | 27 | 26 | 7 | 13 | 30 | c |

NIL: S57TW (2600km), RA3TES, F/G0RDI/p (2900km, ssb), DH6JT, G4SSO (ssb), G4YTL, PA3EPD, JW/DK8ZJ/p JQ78 and DL8EBW.

940812

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0025 0045 | RU1AA | KO59 | 37 | 37 | 4 | 4 | 15 | c r *2 |
| 0055 0205 | DL1KDA | JO30 | 27 | 26 | 5 | 19 | 3 | nc |
| 0205 0310 | ON4ANT | JO20 | 27 | 26 | 5 | 7 | 1 | nc |
| 0310 0330 | ON4GG | JO20 | 27 | 37 | 5 | 7 | 6 | c |
| 0330 0410 | ON4ANT | JO20 | 27 | 27 | 4 | 7 | 1 | c r |
| 0600 0705 | DL5DTA | JO61 | 37 | 26 | 5 | 2 | 7 | nc |
| 0705 0714 | DG6LS | JO54 | 27 | 38 | 4 | 5 | 20 | c s |
| 0838 0840 | OY/G4PIQ | IP61 | 38 | 27 | 3 | - | 30 | c s r *2 |
| 0844 0848 | DK9OY | JO52 | 39 | 27 | 10 | - | 20 | c s *3 |
| 0900 0930 | DL1KDA | JO30 | 38 | 27 | 3 | - | 10 | nc s r *4 |
| 0916 | DG6JF/p | | 39 | 38 | 1 | - | 10 | nc s r |
| 0942 1000 | PA3EPD | JO21 | 38 | - | 2 | - | 10 | nc s r |
| 1000 1050 | DC7UT | JO42 | 28 | 27 | m | m | 40 | c s *5 |
| 1100 1102 | G6RAF | IO92 | 39 | 39 | 1 | - | 30 | c s |
| 1102 1110 | PA2CHR | JO22 | 38 | 36 | 3 | - | 20 | c s r |
| 1110 1122 | G4SWX | JO02 | 39 | 38 | 5 | - | 20 | c s r |
| 1200 1255 | G3IMV | IO91 | 27 | 26 | 3 | 5 | 5 | c |

NIL: OK2SBL, DG1VL (ssb). Remarks: *1 Was that really him? *2 Sidescatter *3 He copied me afterwards almost conituously for 10 min! *4 2200km! *5 He did not break.

### LA0BY/p in JP98AW wkd on 144 MHz:

940813

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0600 0620 | OH5IY/4 | KP31 | 27 | 38 | 5 | 7 | 4 | c |
| 0655 0750 | OH7PI | KP32 | 27 | 27 | 8 | 4 | 4 | c |
| 0800 0830 | OH2TI | KP20 | 27 | 27 | 14 | 15 | 60 | c |
| 0830 0905 | OH2BAP | KP20 | 27 | 27 | 11 | 18 | 20 | nc r |
| 0905 0930 | PA3BIY | JO22 | | | | | | nil |
| 1000 1015 | GM4YXI | IO87 | 38 | 26 | 26 | - | 30 | c |
| 1030 1100 | LA4XGA | JP33 | 28 | 28 | 14 | 27 | 30 | c r |
| 1100 1125 | DF8LC | JO53 | 48 | 26 | 8 | 11 | 30 | c r |
| 1230 1315 | DL5BCU | JO43 | 26 | 26 | 2 | 5 | 5 | nc |
| 1315 1350 | DL6LAU | JO54 | 36 | 27 | 6 | 6 | 6 | nc |
| 1400 1425 | LA8KV | JP52 | 27 | 26 | 7 | 8 | 4 | c |
| 1500 1605 | SK6HD | JO68 | 27 | 27 | 15 | 15 | 2 | c |
| 1800 1840 | RX1AS | KO59 | 27 | 27 | 9 | 9 | 6 | c *5 |
| 1840 1900 | OH7MA | KP52 | 26 | | 1 | 4 | - | nc |
| 1900 1930 | OH2BNH | KP20 | 27 | 27 | 14 | 21 | 2 | c |
| 1935 2000 | OH7MA | KP52 | 37 | 26 | 5 | 4 | 10 | c r |
| 2000 2050 | SM3BEI | JP81 | 26 | 37 | 13 | 10 | 1 | c |
| 2100 2145 | RU1AA | KO59 | 27 | 27 | 12 | 15 | 2 | c |
| 2145 2220 | RZ1AWR | | 27 | | 1 | 2 | 4 | nc *6 |
| 2300 2400 | DK9OY | JO52 | 26 | 26 | 9 | 8 | 2 | c |

940814

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 0000 0030 | DF7KF | JO30 | | | | | | nil |
| 0300 0330 | G4FUF | JO01 | | | | | | nil |
| 0410 0450 | SM7SCJ | JO65 | 27 | 27 | 17 | 12 | 1 | c r |
| 0500 0520 | DL4EA | JO31 | | | | | | nil |
| 0520 0540 | DL6LAU | JO54 | 27 | 27 | 11 | 3 | 1 | c r |
| 0540 0610 | DG6LS | JO54 | 27 | 27 | 8 | 10 | 2 | c s |
| 0705 0800 | DL3LBK | JO54 | 26 | 27 | 12 | 8 | 1 | c |
| 0800 0820 | DL7AKA | JO62 | 26 | 27 | 4 | 6 | 15 | c |
| 0840 0855 | DL3LBK | JO54 | 26 | 36 | m | m | 15 | c r |
| 0900 1000 | DL5BCU | JO43 | 26 | 38 | 6 | 6 | 20 | c |
| 0958 1012 | SM6KJX | JO67 | 37 | 37 | 3 | 3 | 20 | c r |
| 1015 1040 | G0GMS | IO91 | | | | | | nil |
| 1100 1150 | GM4CXM | IO75 | 26 | 27 | 2 | 2 | 8 | c |

Remarks: *5 LA4XGA said he copied me 59A via Aurora but the event passed unnoticed by me - did anybody else make similar observations? *6 Sri I had to switch the PA off for some minor repair.

Since I had not so much time for preparations this year (still it was a lot), LA5TFA and myself decided to visit two squares which were not that far away from our homes (3 hours by car). I operated before from JP89 and knew therefore we would have a clear horizon. Just to bring a new square on-the-air we also went to JP98 which is a very mountainous area.

As compared to earlier activities we did a little improvement on the equipment and operated with 2 x 17-ele-F9FT and a 3CX800-PA. The PA made us dependent on locating a 230V out in the field. Luckily we enjoyed support from friendly locals in both places. With that level of ERP we were particularly interested to try long distance contacts. And the Perseids seemed to be the right shower. Due to the good take-off (0 deg towards SSW) the results from JP89 almost lived up to my expectations. Still I believe we could have done better with more luck in the scheduling. The take-off from JP98 was not as good as from JP89 but still much better than expected. The elevation towards S-SW was around 2 deg which limited the maximum distance to probably less than 2000 km.

For the first time I based the scheduling almost entirely on the shower efficiency computations from OH5IY's MS-Soft 4.2e. My own observations generally confirmed the correctness of the predictions. A high shower efficiency obviously identified the times with the longest reflections. Skeds were succesful also at times were the predictions indicated an efficiency minimum but then the reflections were then usually weak and short. One drawback of the software is that it cannot predict the absolute number of reflections but Illka may eventually succeed to implement even that. I was impressed how accurate the maximum prediction of MS-Soft 4.2e works (I checked also with previous years). G6RAF and G3IMV clearly benefitted from that.

Being the only operator at the 2m station was VERY VERY exhausting. I had to survive on less than 20 hours sleep within the 6 days of the trip. And most of this was not planned because I fell in coma (hi) on the evening of August 12, after having moved to JP98. This sabotaged my whole strategy because I had hoped to operate from JP98 during the second maximum of the shower (I have to apologize for missing a few skeds). For possible expeditions next year I would very much appreciate to be joined by another 1 or 2 good MS-operators. There are many interesting squares around...

HF propagation was not very kind to Northern Norway this year, so most of the scheduling was done through the Internet. Many VHF amateurs have that possibility and the number is rapidly growing. I would be pleased to receive a note in case you should have a connection (my address is stefan@eiscat.no). I do not plan any further MS activity until summer next year but maybe there will be a chance to operate again from KP07 during the winter.

Best regards and thanks for all the efforts, Stefan (LA0BY)

**LA8KV (JP52QQ) wkd on 144MHz:**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940804 | | | | | | | | |
| 1220 1240 | DL9YEY | JO41GV | 27 | 26 | 10 | 18 | 5 | c |
| 1400 1420 | DK8LV | JO44SJ | 27 | 26 | 6 | 29 | 2 | c |
| 940806 | | | | | | | | |
| 0500 0525 | DJ3MY | JN58QD | 36 | 27 | 12 | 28 | 6 | c |
| 0600 0627 | ON4QQ | JO20FS | 27 | 26 | 15 | 28 | 1 | c |
| 940807 | | | | | | | | |
| 0900 0930 | OH9NYW | KP25GR | 27 | 27 | 4 | 10 | 3 | c |
| 2000 2045 | OZ8ZS | JO55RT | - | - | - | 9 | - | nc |
| 940808 | | | | | | | | |
| 0500 0520 | DL3YEL | JO41EV | 27 | 27 | 10 | 9 | 3 | c |
| 2100 2130 | OK2SBL | JN99 | 36 | 27 | 6 | 16 | 7 | c r |
| 940809 | | | | | | | | |
| 1030 1130 | G4XBF/p | IN79JX | 27 | - | 3 | 2 | 2 | nc |
| 1800 1815 | JX7DFA | IQ50OV | 27 | 49 | 12 | 17 | 3 | c |
| 1900 2000 | ON4KHG | JO10WK | 27 | 26 | 9 | 4 | 2 | c |
| 2237 2305 | SP2OFW | | 27 | 27 | 7 | m | 2 | c r |
| 940810 | | | | | | | | |
| 1022 1045 | PA3FJY | | 37 | - | m | m | 15 | nc r |
| 1028 | PE1OGF | | 37 | 27 | 1 | - | - | c s r |
| 1327 1415 | LA0BY/p | JP89KB | 27 | 37 | 8 | 12 | 1 | c |
| 2125 2200 | HA7UL | JN97 | 37 | - | 4 | 6 | 14 | nc r |
| 2200 2300 | S51AT | JN75GW | 26 | - | 1 | - | 3 | nc |
| 940811 | | | | | | | | |
| 0200 0212 | HA5CW/0 | KN07SU | 28 | 26 | 6 | 19 | 28 | c |
| 0212 0225 | HA0HO | KN07SU | 27 | 26 | 4 | 5 | 30 | c |
| 1032 | PA3EPD | | 37 | 27 | 1 | - | - | c s r |
| 2200 2300 | UT5ER | KN87ER | 27 | 26 | 5 | 6 | 2 | c |
| 2300 2350 | I4XCC | JN63GV | 26 | 27 | 3 | 6 | 2 | c |
| 940812 | | | | | | | | |
| 0200 0225 | US5WU | KO20DI | 27 | 27 | 10 | 15 | 20 | c |
| 0855 | G4XEN | | 37 | 37 | 1 | - | - | c r |
| 1039 | G0PES | | 37 | 36 | 1 | - | - | c r |
| 1414 | G1GEW | | 36 | 26 | 1 | - | - | c r |
| 1426 | DL3YEL | | 27 | 37 | 1 | - | - | c r |
| 1426 | D?1YU | | 27 | - | 1 | - | - | nc r |
| 1426 | OK1KPU/p | | 37 | 49 | 1 | - | - | c r |
| 1445 | DF1CF | | 26 | 27 | 1 | - | - | c r |
| 1451 | GM4YXI | | 37 | 59 | 1 | - | - | c r |
| 1453 | ON4ANT | | 27 | - | 1 | - | - | nc r |
| 2000 2020 | SP9PRO/7 | KO10AT | 37 | 38 | 8 | 10 | 18 | c |
| 2200 2255 | HB9BQU | JN37VD | 26 | 26 | 5 | 8 | 2 | c |
| 940813 | | | | | | | | |
| 0000 0050 | YU7EF | KN04HV | 26 | 27 | 4 | 6 | 3 | c |
| 0050 0200 | YU7AU | KN04HU | 36 | 26 | 4 | 6 | 12 | c |
| 0901 0910 | G4ASR | | 36 | 36 | m | m | 16 | c r |
| 1243 | DL9YEY | | 26 | 28 | 1 | - | - | c r |
| 1400 1420 | LA0BY/p | JP89AW | 26 | 27 | 9 | 12 | - | c |
| 2000 2100 | SP8RHP | KO10EF | 26 | 27 | 4 | 7 | 3 | c |

NIL skeds: RA3TES, SP6GVU, S51AT, HB9BQU, DG5NEX, 9A1W, YZ7UN, YU7MS, DG9NBT, GW4UWR, 9A4EW, IW2BNA, IW1AZJ. Maximum of the Perseids at my QTH was on Aug, 12th between 1000 and 1200 UTC. Heard many well known VHF-operators on 144.200. 73 es cu, Ken.

**PA2TAB (JO32GB) wkd on 144MHz:**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940709 | OH9MTY | KP46BI | 26 | - | 5 | 12 | 1 | nc |
| 940716 | LA/DL5DTA | | | | | | | |
| | | JP21NV | 26 | 26 | 14 | 23 | | c |
| 940719 | HA7UL | JN97KK | 27 | 26 | 11 | 14 | 4 | c |
| 940722 | S51AT | JN75GW | 26 | 27 | 10 | 16 | | c |
| 940723 | OH6NDD | KP23VH | 26 | 26 | 15 | 36 | 12 | nc |
| | 9A4EW | JN95JG | - | - | - | - | - | nil *1 |
| 940724 | OH5IY/4 | KP31JK | 26 | 26 | 23 | 30 | 10 | c |
| | OH6NDD | KP23VH | 26 | 27 | 11 | 28 | 2 | c |
| | OM9AEM | KN08AJ | 27 | 27 | 14 | 23 | 1 | c |
| 940729 | ES5WE/0 | KO07XX | 26 | 26 | 7 | 25 | 1 | c |
| 940806 | HG7B/0 | KN17 | 27 | 27 | 12 | 19 | 1 | c |
| | S50C | JN76JG | - | - | - | - | - | *2 |
| 940807 | IK2DDR | JN55GN | 27 | 36 | 9 | 28 | 5 | c |
| | IK0IXI | JN52VC | 27 | 27 | 2 | 6 | | nc |
| | HG7B/0 | KN18GD | 36 | 26 | 9 | 26 | 8 | c |
| | 9A4EW | JN95JG | 27 | 27 | 12 | 27 | 3 | c |
| 940808 | EA3FLN | JN12KA | - | - | - | - | - | nil |
| | DL/DL9GJW | | | | | | | |
| | | JP31OB | 26 | 26 | 5 | 11 | 2 | c |
| 940809 | HA3UU | JN96JO | 27 | 49! | 17 | 47 | 7 | c |
| 940810 | G4XBF/p | IN79JX | 26 | - | 4 | 12 | | nc |
| 940811 | SP9COO | KN09KV | 36 | - | 7 | 22 | 18 | nc |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | IK4PMB | JN54MM | 27 | - | 6 | 14 | | nc |
| | LA0BY/P | JP89KB | 26 | 36 | 8 | 13 | 27 | c *3 |
| | IK0IXI | JN52VC | - | - | - | - | - | nil |
| | EA3MD | JN02KI | 27 | - | 2 | 3 | 1.5 | nc |
| | UT7GA | KN56XP | 28 | - | 5 | 5 | 4 | nc |
| 940812 | SP9PRO/7 | KO10 | - | - | - | - | - | *4 |
| | EA4ED | IM79FV | 28 | 36 | 6 | 19 | 19 | c |
| | IK0OKY | JN61GT | 27 | 27 | - | - | - | c s r |
| | 9A4EW | JN95JG | 27 | 36 | - | - | - | c s r |
| | RZ3QS | KO91 | - | - | - | - | - | nil |
| | OY/G4PIQ | IP61 | 27 | 38 | - | - | - | c s r *5 |
| | 9A1CCY | JN85OO | 36 | 27 | - | - | - | c s r |
| 940813 | OH9NDD | KP26TM | 36 | 36 | 7 | 16 | 18 | c |

Remarks: *1 9A4EW had no line voltage *2 S50C had problems with power supply *3 New ODX! *4 Sked, but he was calling PA3BZL, no time for tailend *5 New DXCC # 42. Equipment: TRX R2CW, 150 W out, 14 ele DJ9BV (3.6 wl), preamp MGF1302.

I worked also Crossband 4m/6m:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940808 | G4RKV/p | IN79JX | 26 | - | 6 | 11 | - | nc |
| 940809 | G4RKV/p | IN79JX | 26 | 26 | 9 | 21 | 2 | c |

PaketRadio-BBS: PA2TAB@PI8DAZ. 73, Arie.

**PA3BIY (CM72c) wkd on 144MHz:**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 931003 | | | | | | | | | |
| 0600 | 0635 | YU1BT | KD | 26 | - | 7 | 8 | 1 | nc *1 |
| 931110 | | | | | | | | | |
| 0000 | 0047 | RB5WU | MK | 26 | 27 | 13 | 18 | 9 | c |
| 1130 | 1210 | HA7UL | JH | 27 | 26 | 17 | 17 | 3 | c |
| 931113 | | | | | | | | | |
| 0500 | 0630 | LA7DFA | DX | 27 | 26 | 33 | 91 | 2 | nc |
| 931205 | | | | | | | | | |
| 0400 | 0435 | OH5IY | NU | 26 | 26 | 24 | 37 | 1 | c |
| 931211 | | | | | | | | | |
| 2143 | 2210 | EA4LY | YA | 27 | 27 | m | m | 3 | c r |
| 2222 | 2233 | UA1C | PS | 27 | 27 | m | m | 3 | c r |
| 931212 | | | | | | | | | |
| 0600 | 0640 | LA7DFA | DX | 27 | 28 | 30 | 79 | 3 | c |
| 2130 | 2150 | OH2BNH | MU | 27 | 27 | m | m | 20 | c r |
| 2322 | 2343 | EA2LU | ZC | 27 | 37 | m | m | 5 | c r |
| 931213 | | | | | | | | | |
| 0012 | 0028 | EA3DXU | | 28 | 37 | m | m | 5 | c r |
| 0045 | 0100 | 9A5Y | | 27 | 27 | m | m | 2 | c r |
| 931213 | | | | | | | | | |
| 0135 | 0155 | YU7MS | | 27 | 27 | m | m | 3 | c r |
| 0155 | 0212 | UC2SMM | PN | 27 | 27 | m | m | 3 | c r |
| 0212 | 0232 | SP9EWU | JK | 39 | 28 | m | m | 5 | c r |
| 931214 | | | | | | | | | |
| 0040 | 0103 | ES5RY | NS | 37 | 27 | m | m | 10 | c r |
| 940103 | | | | | | | | | |
| 1115 | 1140 | HA6NQ | JI | 26 | 27 | 12 | 9 | 1.5 | c |
| 1912 | 1933 | OH2NHP | MU | 27 | 27 | m | m | 10 | c r |
| 2010 | 2028 | OH2BNH | MU | 39 | 28 | m | m | 15 | c r |
| 2330 | 0008 | UA1ALZ | PT | 37 | 27 | 5 | - | 10 | c r |
| 940104 | | | | | | | | | |
| 0035 | 0045 | YU7EF | KE | 37 | 37 | m | m | 5 | c r |
| 0100 | 0230 | LA5TFA | JD | 26 | - | 2 | - | - | nc *2 |
| 940116 | | | | | | | | | |
| 0100 | 0128 | US5WU | MK | 27 | 27 | 10 | 17 | 20 | c |
| 940123 | | | | | | | | | |
| 2200 | 2300 | S57TW | HF | 28 | 27 | 22 | 58 | 1.5 | c |
| 940306 | | | | | | | | | |
| 0506 | 0533 | IK0BZY | GB | 26 | 27 | 14 | 36 | 1 | c |
| 940320 | | | | | | | | | |
| 0515 | 0613 | OH5IY | NU | 27 | 26 | 33 | 58 | 1 | c |
| 940423 | | | | | | | | | |
| 0300 | 0400 | OH9NDD | MA | 26 | 26 | 7 | 14 | - | nc |
| 940424 | | | | | | | | | |
| 0400 | 0505 | OH9NDD | MA | 26 | 26 | 10 | 26 | 1.5 | c |
| 940501 | | | | | | | | | |
| 0400 | 0428 | S51AT | HF | 26 | 26 | 7 | 6 | - | c |
| 940507 | | | | | | | | | |
| 0420 | 0445 | CT/DF7KF | WY | 27 | 26 | 21 | 47 | 2 | c *3 |
| 940529 | | | | | | | | | |
| 0600 | 0620 | S51AT | HF | 27 | 27 | 7 | 16 | 2 | c |
| 940605 | | | | | | | | | |
| 0400 | 0500 | YL2MB/a | NQ | 26 | 27? | 2 | 14 | - | nc *4 |
| 940612 | | | | | | | | | |
| 1120 | 1138 | EA6VQ | BZ | 37 | 27 | 30 | 40 | 10 | c |
| 940618 | | | | | | | | | |
| 1440 | 1500 | S51AT | HF | 27 | 27 | 9 | 11 | 3 | c |
| 940621 | | | | | | | | | |
| 0300 | 0354 | US5WU | MK | 27 | 26 | 10 | 21 | 5 | c |
| 940711 | | | | | | | | | |
| 0300 | 0400 | OH9NDD | MQ | 26 | 26 | 8 | 24 | | nc |
| 940716 | | | | | | | | | |
| 0400 | 0421 | LA/DL5DTA | CV | 26 | 27 | 10 | 14 | 20 | c |
| 940723 | | | | | | | | | |
| 0325 | 0400 | OH6NDD | MX | 26 | - | 6 | 10 | - | nc *5 |
| 2100 | 2135 | SP2OFW | JN | 27 | 27 | 13 | 19 | 1 | c |
| 940727 | | | | | | | | | |
| 2000 | 2100 | S51AT | HF | 26 | - | - | - | - | nc |
| 940729 | | | | | | | | | |
| 0432 | 0500 | ES5WE/0 | KR | 27 | 27 | 16 | 15 | 2.5 | c r |
| 940807 | | | | | | | | | |
| 2018 | 2032 | HG7B/0 | LI | 27 | 38 | 14 | 11 | 5 | c |
| 940809 | | | | | | | | | |
| 2354 | 0020 | YZ7UN | | 28 | 27 | m | m | 3 | c r |
| 940810 | | | | | | | | | |
| 2022 | 2047 | HA9RC | | 27 | 27 | m | m | - | c r |
| 2045 | 2100 | HA3UU | | 27 | 28 | m | m | - | nc r |
| 940811 | | | | | | | | | |
| 0000 | 0100 | LA0BY/p | ID | 26 | 26 | 7 | 14 | 5 | c |
| 0117 | 0133 | YU7FU | | 28 | 27 | m | m | 8 | c r |
| 0133 | 0200 | 9A4FW | | 27 | 27 | - | - | - | nc *6 |
| 0200 | 0220 | 9A4RG | | 28 | 27 | - | - | - | nc *6 |
| 940812 | | | | | | | | | |
| 0000 | 0100 | JX7DFA | VE | 26 | 26 | 6 | 15 | - | nc *7 |
| 0200 | 0223 | SP9PRO/7 | LK | 38 | 26 | 18 | 10 | 7 | c |
| 0250 | 0300 | HA3UU | | 38 | 28 | m | m | - | nc *6 |
| 0255 | 0305 | YU7EF | | 37 | 38 | m | m | - | c r |
| 0406 | 0409 | OY/G4PIQ | | 38 | 37 | - | - | 10 | c s r |
| 0600 | 0620 | EA4ED | XZ | 38 | 26 | 16 | 13 | 40 | c fb! |
| 0640 | 0700 | OH2AUK | LT | 27 | 26 | m | m | 8 | c r |
| 0848 | | CT1WW | WB | 37 | 37 | 1 | | | c s r |
| 0952 | | ES2RJ | | 27 | 27 | 1 | | | c s r |
| 1052 | | EA6FB | AY | 27 | 27 | 1 | | | c s r |
| 1448 | | GM4YXI | YR | 37 | 37 | 1 | | | c s r |
| 940813 | | | | | | | | | |
| 0009 | 0016 | 9A1CCY | | 37 | 37 | 5 | - | 8 | c s r |
| 0033 | | HA3UU | | 27 | 39 | 1 | | | c s r |
| 0016 | | LZ3UF | | 27 | 27 | 1 | | | nc s r |
| 0050 | | UT8AL | | 27 | 27 | 1 | | | c s r |
| 0443 | | HA5CW | | 27 | 27 | 1 | | | c s r |
| 0500 | 0600 | US1VQ | PI | 26 | 26? | 2 | - | 7 | nc *8 |
| 0900 | 0945 | LA0BY/p | JC | 26 | - | 1 | 8 | - | nc |
| 940814 | | | | | | | | | |
| 0000 | 0200 | JX7DFA | VE | 27 | - | 4 | 5 | 1.5 | nc *9 |

NIL: LA5TFA (931118), UA3MHJ (940104), LA0BY/P (940612), OH9NYW (940621).

Remarks: *1 NIL after 20 min *2 Very weak, 2100km *3 Received some very long bursts from them in previous skeds

*4 He was 1 kHz too high. After 30 min NIL *5 I overslept 25 min, SRI! *6 He called me for 2 periods with good reflections, then NIL, why? *7 I got some good bursts in the previous sked with PA3FOC. Long distance conditions seemed to deteriorate after 0 UTC. *8 I found him after 10 min 2 kHz too low. Unfortunately weak reflections so not all info ok. *9 First 45 min NIL. Then in 32 min time (all) 4 bursts, then NIL again. PITY!

Correction to my last report:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 930803 | | | | | | | | |
| 2008 2122 | G0JLF/TF/p | SY | 27 | 26 | 14 | 31 | 10 | c! r |

Slip of the keyboard (!), made a mistake while typing. QSO was 100% complete.

Equipment: 2 x 9 ele, 400 W, ALL home made. I am always interested in any MS test. Tel: ++31-17319601. 73, Peter.

**RX6AKO (KN84PK) wkd on 144MHz:**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 940806 | | | | | | | |
| 2215 2235 | HG7B/0 | LI | 27 | 28 | 9 | 10 4 | c *1 |
| 940808 | | | | | | | |
| 2100 2200 | SK6HD | GS | | | | | nil |
| 940809 | | | | | | | |
| 2200 2300 | DL9NDD | FJ | | | | | nil |
| 940811 | | | | | | | |
| 2200 2215 | DL3BWW | HM | 38 | 27 | 12 | 9 8 | c *2 |
| 940812 | | | | | | | |
| 0000 0100 | OH8UV | NY | 26 | 2? | 3 | 2 1 | nc |
| 940813 | | | | | | | |
| 0000 0100 | UA3MHJ/3 | RS | | | | | nil |
| 2300 2400 | OK1MAC/P | HJ | 26 | 27 | 6 | 30 1.5 | nc *3 |

Remarks: *1 Max. S9 *2 Max. S8 *3 Max. S7. 73, Gennady.

**SM7SJR (JO89FA) wkd on 144MHz:**

| | | | | | |
|---|---|---|---|---|---|
| 940729 | | | | | |
| 0400 0453 | 9A2KK | JN85KV | 27 | 37 | c |
| 0600 0640 | DK2PH | JO41GV | 26 | 26 | c |
| 0700 0750 | DL9YEY | JO41GV | 26 | 26 | c |
| 940803 | | | | | |
| 0500 0516 | 9A4EW | JN95JG | 26 | 38 | c |
| 940809 | | | | | |
| 0500 0520 | ON4GG | JO20AR | 37 | 37 | c |
| 1000 1045 | G0EVT | IO93GR | 37 | 26 | c |
| 940811 | | | | | |
| 1900 1940 | S50C | JN76JG | 26 | 26 | c |
| 2000 2055 | DH6JT | JO31JO | 26 | 26 | c |
| 2100 2125 | IK1JXY | JN44WC | 26 | 27 | c |
| 2125 2140 | IK1LBW | JN44 | 26 | 27 | c t |
| 2200 2225 | DL1KDA | JO30FQ | 27 | 27 | c |
| 2225 2300 | DF7KF | JO30 | 26 | 27 | c t |
| 2300 2320 | DL3IAE | JN49DE | 38 | 27 | c |
| 940812 | | | | | |
| 0100 0125 | I4XCC | JN63GV | 27 | 27 | c |
| 0200 0305 | GM4VVX/p | IO78WA | 27 | 27 | c |
| 0305 0326 | 9A1CDD | JN85LW | 38 | 27 | c |
| 0435 0516 | F1OAQ | | 27 | 37 | c r |
| 0600 0614 | F5HRY | JN18EQ | 38 | 37 | c |
| 0700 0708 | G4ASR | IO81MX | 38 | 37 | c |
| 0830 0843 | HA3UU | JN96JO | 38 | 38 | c r |
| 0850 0904 | G4RGK | | 37 | 37 | c r |
| 1020 | G8XVJ | IO83RJ | 27 | 27 | c s r |
| 940821 | | | | | |
| 0500 0547 | ON4KHG | JO10WK | 27 | 27 | c |
| 940827 | | | | | |
| 0500 0556 | DL5MAE | JN58VF | 27 | 27 | c |

Remarks: During qso's on 940811 and 940812 SM7THS also participated. Equipment: TS-850 + FTV-707 transverter + preamp in the shack + 2x4CX250B with limited power (TVI) 100-400W output + Ant 17B2 at 20m asl. I live 300m away from Baltic sea! We will also be qrv in BCC MS-contest. 73, Bob, good reflections to you all!

## MS Expedition to KO10 Square

**SP9PRO/7 (KO10AU) wkd on 144MHz:**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 940810 | | | | | | | | |
| 2000 2029 | I4XCC | JN63 | 27 | 27 | 5 | 3 | 2 | c |
| 2100 2146 | UA3T | LO16 | 26 | 26 | 6 | 2 | 3 | c |
| 2200 2300 | DL3YEL | JO40 | 26 | | 1 | 15 | 2 | nc |
| 2300 2321 | ON4KHG | JO10 | 26 | 27 | 2 | 1 | 3 | c |
| 940811 | | | | | | | | |
| 1100 1147 | DF1SO | JN48 | 26 | 26 | 4 | 3 | 4 | c s |
| 1200 1300 | G4FUF | JO01 | 26 | 26 | 3 | m | 3 | c |
| 1300 1323 | ON4GG | JO20 | 26 | 26 | 5 | 8 | 7 | c s |
| 1324 1337 | ON4ANT | JO20 | 27 | 27 | 5 | 5 | 5 | c s |
| 2000 2100 | PA2JOK | JO21 | 26 | 27 | 5 | 1 | 15 | nc |
| 2100 2109 | UA4AQL | LO20 | 26 | 27 | 3 | 2 | 20 | c |
| 2115 2200 | RW4AK | LO20 | 26 | 27 | 3 | 5 | 120! | c |
| 2200 2230 | DH6JT | JO31 | 26 | 36 | 4 | 1 | 4 | c |
| 2240 2300 | DL9YEY | JO41GV | 26 | 27 | 3 | 1 | 3 | nc |
| 2300 2344 | IK0OKY | JN61 | 26 | 27 | 4 | | 4 | c |
| NIL: F6DRO, RX6AKO, EA3FLN and EA3MD. | | | | | | | | |
| 940812 | | | | | | | | |
| 0200 0219 | PA3BIY | JO22 | 26 | 38 | 3 | 1 | 4 | c |
| 0300 0339 | PA3BZL | JO22 | 26 | 27 | 3 | 3 | 3 | c |
| 0304 | PA3EPD | JO21 | 37 | 27 | 1 | | | c s r |
| 0723 | 9A2DG | JN95 | 37 | 26 | 1 | | | c s r |
| 0816 0823 | F6CBH | JN19 | 37 | 37 | 2 | | | c s r |
| 0844 | G6RAF | IO92PP | 27 | 27 | 1 | | | c s r |
| 0900 0911 | I2FHW | JN45 | 26 | 26 | 2 | | 10 | c s |
| 0927 | IW0AYO | JN61 | 37 | 27 | 1 | | 10 | c s r |
| 0936 | IT9IPQ | JM78 | 37 | 27 | 1 | | | c s r |
| 1000 1003 | IW2BNA | JN44 | 26 | 26 | 2 | | 13 | c s |
| 1100 1113 | DF1IAZ | JN49LD | 26 | 26 | 3 | 8 | 7 | c s |
| 1200 1209 | ON1ALJ | JO10 | 26 | 27 | 3 | | 5 | c s |
| 1210 1215 | ON1AEN | JO10 | 26 | 27 | 2 | | 6 | c s |
| 1219 | ON1ALJ | JO10 | 59 | 59 | 1 | | >30 | c s |
| 1237 | G8XVJ | IO83 | 39 | 39 | 1 | | | c s r |
| 1250 | DL8LAQ | JO43XU | 37 | 27 | 1 | | | c s r |
| 1300 1400 | F5JRX | JN25 | 26 | 27 | 4 | | 4 | c s |
| 2000 2008 | LA8KV | FW | 28 | 28 | 2 | | 120! | c |
| 2100 2131 | DK9OY | JO52CK | 26 | 27 | 4 | m | 15 | c |
| 2140 2200 | DJ7OF | JO51 | 26 | 27 | 2 | 3 | 5 | c |
| 940812 | | | | | | | | |
| 2200 2235 | DL8EBW | JO31NF | 26 | 26 | 3 | 5 | 4 | c |
| 2235 2300 | DL1EAP | JO31 | 26 | 37 | 4 | 10 | 3 | c |
| 2300 2318 | DK2PH | JO41 | 26 | 26 | 3 | | 5 | c |
| 2321 2400 | DL3YEL | JO41 | 26 | | 1 | 10 | 3 | nc |
| NIL: OH5IY/4 and PA3FOC. | | | | | | | | |
| 940813 | | | | | | | | |
| 0000 0042 | G4YTL | IO92 | 26 | 37 | 4 | 8 | 20 | c |
| 0100 0138 | G0FIG | IO90 | 27 | 26 | 3 | 2 | 5 | c |
| 0200 0233 | OH7PI/4 | KP42 | 57 | 27 | 10 | m | 120! | c |
| 0300 0312 | OH8UV | KP34 | 37 | 47 | 4 | | 20 | c |
| 0315 0333 | OH5IY/4 | KP31 | 38 | 39 | 3 | | 15 | c |
| 0900 0907 | IW5AVM | JN52 | 26 | 26 | 7 | 15 | 6 | c s |
| 0920 0945 | IK5OIY | JN52 | 26 | 26 | 8 | 8 | 4 | c s |
| 1000 1004 | DC9KZ | JO30 | 26 | 27 | 3 | 1 | 6 | c s |
| 1012 1100 | DC6KI | JO30 | | 27 | 1 | | 2 | nc s |
| 1100 1145 | IK1JXY | JN44 | 26 | 27 | 5 | 12 | 3 | c s |
| 1300 1400 | PE1LAU | JO33 | 26 | 26 | 3 | 1 | 4 | c s |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2000 2034 PA0RDY | JO22 | 26 | 26 | 5 | 7 | 7 | c *1 |
| 2100 2138 RA3TES | LO15 | 26 | 26 | 3 | 7 | 4 | c *1 |
| 2200 2239 DK8LV | JO44 | 26 | 26 | 4 | 10 | 3 | c *1 |
| 2300 2358 SM5MIX | JO78 | 37 | 27 | 20 | m | 12 | c *1 |

NIL: IK1LBW and IV3HWT.

940814

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0005 0044 HB9JAW | JN47 | 26 | 26 | 4 | 2 | 3 | c *1 |
| 0100 0129 DF6NA | JN49 | 26 | 27 | 4 | 7 | 4 | c *1 |
| 0200 0228 PA3EFC | JO22 | 26 | 27 | 5 | m | 4 | c *1 |
| 0300 0349 OH2TI | KP20 | 26 | 26 | 5 | m | 8 | c *1 |
| 1110 1143 OH7MA | KP52 | 26 | 26 | 4 | 2 | 4 | c *1 |
| 2000 2049 DL8GP | JN39 | 26 | 26 | 8 | 18 | 5 | c |
| 2300 2353 PA3BZO | JO21 | 26 | 27 | 10 | 20 | 4 | c |

NIL: IW1AZJ, IK2DDR, S51AT and DL9NDD.

940815

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0000 0034 DL1KDA | JO30 | 26 | 27 | 17 | m | 5 | c |
| 0040 0054 DJ7KF | JO30 | 26 | 27 | 7 | m | 4 | c |
| 0100 0114 DL3IAE | JN49 | 26 | 27 | 6 | 5 | 3 | c |
| 0120 0200 DL2IAN | JN49 | | 27 | 1 | | 1 | nc |

Remarks: *1 Thunderstorm and no line voltage, then QRP-station was used with 70W output only. Equipment:
1) Main station - home-made 250W out + 2x13ele F9FT
2) 2nd station - IC-275H without PA + 17ele F9FT
Also computer Laptop-386SX + MS-programm OH5IY 4.06, tape recorder MSD1402 + up-converter, petrol generator 'Yamaha' 450VA.

Operators were: Janek SP9EIJ, Antek SP9ERV, Janusz SP9EWO, Michal SP9LCV, Leonard SP9SNK, Piotr SP9QMP, Tadek SQ9BDQ / DL2SDQ and Heniek SP9-3021. Some of them made their first MS-QSO, hi. SP9EWU co-operated from home QTH. QSL-cards and remarks about this MS-operation are welcome to SP9PRO Radio Club, P.O.Box 131, 44-201 Rybnik. 73, Wojtek.


**SP9PRO in KO10**

**UT5JCW (KN64SN) wkd on 144MHz:**
31.07.94 RW4AK LO20, 05.08.94 S57TW JN75, 06.08.94 HA3UU JN96, 07.08.94 HG7B/0 KN18, 09.08.94 DL9YEY JO41, 11.08.94 S50C JN76, 12.08.94 OK2SBL JN99 random and UA3MHJ/3 KO78, 13.08.94 HA8CE KN06, US5WU KO20 and HA5CW/0 KN07.
The peak of the shower was very poor this year! Equipment: FT-480R + PA 400W + 13ele F9FT. 73, Serge (PR: UT5JCW@UA9AJ).

## MS Expedition to KN56 Square

The expedition to KN56XP was organized by Alex UT7GA (ex RB5GU), Serge UT7GB (ex RB5GBX) and UT7GZ (ex RB5GZ). The equipment: PA 700W, 10 ele long yagi, RX 1dB NF.

**UT7GA (KN56XP) wkd on 144MHz:**

940809

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1900 1955 9A4FW | JN95 | 27 | 27 | - | - | - | c |
| 2300 2355 DL9YEY | JO41 | 26 | 26 | - | - | - | c |

940810

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2100 2200 SK6HD | JO68 | 27 | 27 | - | - | - | c |

940811

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0000 0045 HA3UU | JN96 | 37 | 28 | - | - | - | c |
| 2200 2300 ON4GG | JO20 | 26 | 26 | - | - | - | c |

940812

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0000 0055 HA7UL | JN97 | 27 | 27 | - | - | - | c |
| 0240 0300 S57EA | | 27 | 27 | - | - | - | c r |
| 0330 0400 DF0CI | | 27 | 27 | - | - | - | c r |
| 0405 0435 DL9NDA | | 27 | 27 | - | - | - | c r |
| 1840 1910 DK9OY | JO52 | 38 | 37 | - | - | - | c r |
| 1910 1940 DL5MAE | | 38 | 27 | - | - | - | c r |

940813

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0100 0120 DK8LV | | 27 | 27 | - | - | - | c r |
| 2200 2240 IK2DDR | JN55 | 37 | 37 | - | - | - | c |
| 2300 2355 PA3BZO | JO21 | 26 | 26 | - | - | - | c |

940814

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0000 0015 DF9YF | | 37 | 37 | - | - | - | c r |
| 0015 0025 DF6NA | | 27 | 26 | - | - | - | c r |
| 0055 0110 OH2TI | | 38 | 37 | - | - | - | c r |
| 0300 0325 S51AT | | 27 | 27 | - | - | - | c r |

**UT7GB (KN56XP) wkd on 144MHz:**

940809

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2200 2300 DK2PH | JN49 | 27 | 26 | - | - | - | c |

940810

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2200 2300 I4YNO | JN54 | 27 | 37 | - | - | - | c |
| 2300 2355 DF6NA | JN49 | 26 | 26 | - | - | - | c |

940811

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2300 2355 ON4ANT | JO20 | 37 | 27 | - | - | - | c |

940812

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 2200 2300 DL7OF | JO51 | 27 | 27 | - | - | - | c |

940814

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 0140 0150 OH2TI | | 28 | 37 | - | - | - | c r |

The QSL-Address for the expedition is Alex, P.O.Box 5, Kherson, 325000 UKRAINE. Thanks for info, Alex UT7GA.

## MS Expedition to KN99

The expedition to KN99FD was organized by UT4EQ, UT5EC and UR3EE. We used a single Yagi DJ9BV and a 1KW PA. Before our operation we got a "Murphy hit": The GaAs-FET preamplifier was destroyed by the PA. This explains our unlucky job over more than 2100km distances (except the QSO with I2FAK). But anyway, we are really enjoyed to work 43 complete QSO by MS and 1 EME QSO with I2FAK. We got a little dissapoint shower peak traveled out of our area. Thanks to everybody for cooperation.

### UR5M (KN99FD) wkd on 144MHz:

940810

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0900 | 1000 | S51AT | JN75GW | 26 | 27 | 3 | 5 | 20 | c |
| 1000 | 1100 | OK2SBL | JN99HQ | - | - | - | 2 | - | nc |
| 1100 | 1135 | HA5CW/0 | KN07SU | 27 | 28 | 4 | 5 | 5 | c |
| 1135 | 1200 | S57TW | | 27 | 27 | 1 | 1 | 2 | nc |
| 1400 | 1440 | OE3JPC | JN88EB | 26 | 26 | 3 | 3 | 2 | c |
| 1500 | 1535 | SP2OFW | JO93AC | 26 | 27 | 4 | 2 | 3 | c |
| 1700 | 1715 | HA3UU | JN96JO | 26 | 27 | 3 | | 2 | c |
| 1800 | 1900 | OK2SBL | | 27 | 27 | 2 | 1 | 1 | nc |
| 2000 | 2100 | DL8LAQ | JO43XU | 26 | - | 1 | 1 | 2 | nc |
| 2100 | 2130 | DF8LC | JO53GX | 26 | 26 | 3 | 4 | 15 | c |
| 2130 | 2220 | DK1KO | JO53CT | 38 | 27 | 5 | m | 30 | c |
| 2300 | 2320 | OH2TI | KP20KE | 26 | 27 | 2 | 4 | 2 | c |

NIL: I2FAK, DF6NA, YU7EW, OH5IY/4 (qrm) and DL9NDD. Remarks: *1 2000km *2 2007km

940811

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0000 | 0025 | HA8CE | KN06EN | 27 | 28 | 2 | - | 3 | c |
| 0025 | 0100 | OK2SBL | JN99NQ | 27 | 27 | 2 | - | 4 | c |
| 0200 | 0230 | 9A1CCY | JN85OO | 28 | 39 | 3 | 4 | 4 | c |
| 0300 | 0400 | DF1SO | JN48PO | 27 | - | 2 | - | 1 | nc |
| 0400 | 0430 | YU7EF | KN04HF | 27 | 37 | 3 | m | 1 | c |
| 0600 | 0645 | S57TW | | 26 | 27 | 3 | m | 1 | c |
| 0700 | 0740 | OK1JKT | JO60OK | 26 | 28 | 3 | m | 1 | c |
| 0800 | 0825 | S50C | JN76JG | 27 | 26 | 3 | 4 | 15 | c |
| 0900 | 0930 | I4XCC | JN63GV | 28 | 27 | 4 | | 5 | c *1 |
| 1000 | 1100 | I2FAK | JN45OB | - | - | - | 2 | - | nc |
| 1100 | 1115 | DL3BWW | JO72GI | 27 | 27 | 2 | - | 1.5 | c |
| 1115 | 1200 | DL7AKA | JO62QO | 27 | - | 2 | - | 1 | nc |
| 1400 | 1440 | SP6GZZ | JO81HI | 26 | 27 | 4 | 7 | 2 | c |
| 1600 | 1700 | YU7AU | | 26 | - | 2 | - | 1 | nc |
| 1900 | 1955 | DL5DTA | JO61VA | 26 | 26 | 3 | m | 3 | c |
| 2000 | 2100 | DL6LAU | JO54CJ | 26 | 26 | 1 | 3 | 1 | nc |
| 2200 | 2215 | DK9OY | JO52CK | 26 | 27 | 2 | - | 2 | c *2 |
| 2230 | 2245 | SP9EWU | JO90 | 27 | 27 | 2 | - | 3 | c |
| 2300 | 2400 | I4YNO | JN54KP | 26 | - | 1 | - | 1 | nc |

NIL: I1KTC, DF5BN, DL0WH, DL9YEY, SM6CMU, YU7FU, DL1EAP and SK6HD (qrm). Remarks: *1 2054km, *2 2004km.

940812

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0200 | 0220 | HA7UL | JN97KK | 26 | 26 | 3 | 7 | 1 | c |
| 0220 | 0240 | HA7PL | | 26 | 26 | 2 | 4 | 2 | c |
| 0730 | 0800 | DL6LAU | JO54CJ | 26 | 26 | 3 | 5 | 2 | c *1 |
| 0800 | 0830 | DL7AKA | JO62QO | 26 | 37 | 5 | - | 10 | c |
| 0840 | 0852 | YU7AU | | 26 | 26 | 4 | 5 | 1 | c |
| 1000 | 1100 | I2FAK | JN45OB | 26 | 26 | 4 | - | 5 | c *2 |
| 1300 | 1400 | HA1YA | JN87GF | 28 | 26 | 2 | 4 | 10 | nc |
| 1500 | 1535 | YU7EW | | 27 | 26 | 4 | m | 1 | c |
| 1700 | 1740 | DF0CI | JO51CH | 27 | 27 | 3 | 3 | 2 | c *3 |
| 1800 | 1900 | OH5IY/4 | KP31JK | 26 | 26 | 3 | 4 | 2 | c |
| 1900 | 1940 | SM5MIX | JO78JG | 27 | 27 | 3 | - | 30 | c |
| 1940 | 2010 | OH7PI/4 | KP42HF | 27 | 27 | 3 | - | 2 | c |
| 2055 | 2107 | DL6UAL | | 27 | 27 | 4 | 8 | 5 | c |
| 2107 | 2130 | DL5MAE | JN58VF | 27 | 27 | 4 | 5 | 8 | c |
| 2200 | 2300 | DL8LAQ | JO43XU | 27 | | 1 | - | 3 | nc |

NIL: OK2SGY, OH8UV (qrm), SM6KJX, DL8EBW, OE5KE, ON4ANX, DF1SO and DL5BCU. Remarks: *1 2012km, *2 2245km, *3 2011km.

940813

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0000 | 0020 | RX1AS | KO59FX | 28 | 27 | 3 | - | 5 | c |
| 0020 | 0032 | RZ1AWR | | 37 | 37 | 2 | - | 30 | c |
| 0600 | 0700 | HA1YA | JN87GF | 27 | 27 | 3 | - | 3 | c |
| 1310 | 1400 | LZ1KDP | | 27 | 26 | 3 | 7 | 1 | c |
| 1600 | 1650 | 9A1CDD | JN85LW | 37 | 27 | 4 | m | 15 | c |
| 1715 | 1800 | US5WU | KO20DJ | 26 | 27 | 3 | m | 1 | c |
| 1800 | 1830 | OH2BNH | KP20LG | 27 | 26 | 2 | - | 1 | c |
| 1830 | 1900 | OK1MAC | JN79 | 27 | 26 | 2 | - | 2 | c |
| 1900 | 1950 | SK6HD | JO68SH | 37 | 27 | 3 | 4 | 20 | c |
| 2100 | 2200 | DK2PH | JO41GV | 26 | - | 1 | 1 | 1 | nc |

NIL: OH7MA, 9H1CDD, IK2DDR, IK5UBM, DL1EAP, I2FHW, DK4TG, OH9NDD, SM7FWZ and OH8UV.

QSL info: UT5EC - Valery Petrushenko, P.O.Box 214, Dniepropetrovsk-59, 320059 UKRAINE or UT4EQ - Mike Bratchikov, Klenovaya 5/33, Dniepropetrovsk, 320008 UKRAINE or via UR3EE.

### YU7EF (KN04HV) wkd on 144MHz:

940810

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 2341 | 2352 | PA3FOC | JO21FW | 28 | 27 | 7 | - | 12 | c |

940811

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0000 | 0014 | PA2DWH | JO22EB | 27 | 27 | 7 | 10 | 8 | c |
| 0100 | 0200 | RU1A | KO48VR | - | - | - | - | - | nil |
| 0400 | 0436 | UR5M | KN99FD | 37 | 27 | 14 | 6 | 18 | c |
| 2300 | 2330 | DF6NA | JN49XS | - | - | - | - | - | nil |
| 2330 | 2342 | G3WZT | IO90UX | 26 | 37 | 9 | 4 | 6 | c |

940812

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0041 | 0059 | PA3FJY | JO32EH | 28 | 28 | 10 | - | 5 | c |
| 0208 | 0232 | SM6KJX | JO67CK | 27 | 27 | 15 | - | 10 | c |
| 0235 | 0242 | SM0ERR | JO89WJ | 37 | 38 | 18 | - | 28 | c |
| 0245 | 0300 | PA3BIY | JO22FA | 38 | 38 | 15 | - | 7 | c |
| 1125 | 1142 | EA6/HB9FAP/p | | 37 | 28 | 9 | 4 | 18 | c |
| 1200 | 1227 | LA2PHA | JO38IB | 26 | 27 | 4 | 3 | 15 | c ssb |
| 1400 | 1427 | DL3BWW | JO72GI | 26 | 27 | 15 | 5 | 3 | c |
| 2000 | 2100 | LA/DL9GJW/p | JP31OB | - | - | - | - | - | nil |
| 2300 | 2330 | OZ5QF | JO45VB | 27 | 26 | 14 | 10 | 2 | c |

940813

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0000 | 0055 | LA8KV | JP52QQ | 27 | 26 | 8 | 5 | 3.5 | c |
| 0100 | 0200 | OH8UV | KP34VJ | 26 | 26 | 4 | 3 | 2 | c |

Remarks: *1 2003km *2 2067km *3 2215km.

Comments: Regarding the peak of the shower, it was difficult to say when we had it. From The International Meteor Organisation (IMO) buletin (found at WB4ZDA BBS) Perseids should have had two peaks, one at 7 UT (S.L.=139.45) and second at 15 UT (S.L.=140.1), both on August 12. From my point of view, I couldn't detect those peaks. Reflections were good but not extremly and, if that is of any significance to You, shorter and not that numerous as we know they can be in Perseids. Longest burst I have received was about 30" (but majority of long ones was about 10" to 15") and I remember bursts of more than one minute received in previous occassions. One way or another, I'm not complaining! Got four new squares and missed two. That's not so bad, after all.

My 2m setup was: TR-9000 + 2 * 2N5591 + TH-328 PA (abt. 800W at the antenna) + MGF-1302 (0.4dB/NF) + 4 lambda DJ9BV (8.5m) + KC0Q CMOS Super Keyer II.

Now just a few more info. On monday, 29. August evening, I will be on my way from Frankfurt to Bangkok. Will be there for next 6 months working at the TPI in Rayong, abt. 200km south from Bangkok and 40km from Pataya.

Also, with me will be YU7AU, so You won't hear us for some time on VHF.

According to some info that we got, there is a good chance to get the Licence from there, so we will do our best to show up (possibly 6m too). Thanks for info, Pop.

## MS-Address-List (changes)

| | | |
|---|---|---|
| DC6DY | JO31OK DL47g | Anton Pickhardt, Hofsteder Str. 24, 44791 Bochum, SSB only |
| DD0VF | JO61VB GL79c | Steffen Minack, Polenzstr. 3, 01277 Dresden, ++351-2329379 QRL, SSB only, skeds via DL5DTA |
| DF1IAZ | JN49LD GL | Ralf Haueisen, Friedliebstr. 16, 75050 Gemmingen, PR @DB0RBS.#BW.DEU.EU |
| DG1VL | JO61WCGL80c | Henry Richter, Kurzer Weg 4, 01454 Grosserkmannsdorf |
| DG9NBT | JN49WS EJ20e | Martin Leicht, Industriestr. 8, 97249 Eisingen, ++9306-906949, SSB only |
| DH3IAJ | JN48HD EI64f | Ralf Mittelstädt, Württemberger Str. 32, 78628 Rottweil, ++74121982 or PR @OE9XPI, SSB only |
| DJ3MY | JO58QD FI67d | Christian Dobmeier, Nelkenstr. 5, 82110 Germering, ++8984-16619, PR @DB0AAB.#BAY.DEU.EU, 4x17ele, 100W |
| DK0PX | JN48JC EI74b | see DH3IAJ |
| | | DK2AM |
| | | Dieter Wagner, Grafenweg 10, 26354 Bockhorn |
| DL2DXA | JO61GL GL43b | Bernd Ponetka, Boltenhagener Str. 69, 01109 Dresden, ++351-8806901, CW 1000lpm |
| DL9YEY | JO41GV EL03e | Thomas Fahnenschmidt (ex DH0YAZ), Grubenweg 10, 33415 Verl, ++5246-6621 (Fax -83413), ssb/cw 1500lpm, 6m/2m/70cm, VHF-net |
| F5HRY | JN18EQ BI22c | Herve Biraud (ex F1HRY), 37 Rue Pierre Brossolette, 91600 Savigny Sur Orge, ++33-1-69966879 |
| F6CRP | IN96KE ZG65g | Denis Auquebon, 30 Rue des M-Riers, 17140 Lagord, ++33-46674052, SSB only |
| F9HS | JN03GL AD43a | Claude Dagonneau, Moncassin, 32300 Mirande, 13ele 60W, SSB+CW |
| G6RAF | IO92PP ZM27e | RAF N Luffenham RC, Oakham, Leics. LE15 8RL, SSB only, skeds via GW8VHI |
| IK0VKL | | Flavio Cremasco (ex IW0DRT), Via Antonio Tempesta 28, 00176 Roma, PR IK0VKL@IW0CFV-8 |
| OK1FM | JN69QQ GJ27c | Milan Gutter, Karafiatova 23, 31702 Plzen, Czech. Rep., Fax/Tel ++42-19-7247810, PR OK1FM @ OK0KPL.TCH.EU |
| ON7UC | JO11ND BL66d | Johan van Brabandt, Snellegemsestraat 89, 8210 Zedelgem, ++50-201983 after 19UTC, 144MHz SSB/CW 1200lpm, skeds VHF-net or PR ON7UC @ ON1CED.BEL.EU |
| PE1KHP | JO22XE CM70c | Adriaan Koopman, Rustenburgstraat 130, 7311 JC Apeldoorn, ++3355212846, SSB/CW 1000lpm PR@PI8APD |
| PA2TAB | JO32GF DM63b | Arie Baltes, R.Visscherhof 2, 7471 NH Goor, ++31-547071682, SSB/CW 1500lpm on 6, 2 & 4m-X-Band |

**IW4AOT/4 in JN54OK in IARU-1/UHF**

# ES News

Editor: Edmund Ramm, DK3UZ

**890721 OE1SBB (II63h)** wkd: 1631 RI8TA HX69g 4271km. vln dk fr info

**OE1XLU (II63h)** wkd: 1631 RI8TA HX69g. vln dk fr info

**940516 RX6AKO (SE07e)** wkd: HA0MK KI. спасибо за инфо Геннады

**940521 DK1VI (EJ54f)** wkd: 1249 EA1AEN VC77c. vln dk fr info, Ernst

**940602**

**OE3JPC (II72c)** wkd: 1236 RZ3QS TL18d, 1301 UT5ER RI22b, 1302 RV6HLU VD09g, 1322 UA3GCE TM46e, 1330 UR5LLW SJ22d. vln dk fr info, Johannes

**RX6AKO (SE07e)** wkd: YU7EW KF24f. спасибо за инфо Геннады

**940609 RX6AKO (SE07e)** wkd: DL6NAA FK69b, DF6NA EJ20d. спасибо за инфо Геннады

**940612 IW5ACP (FD05c)** wkd: 1307 LA2AB FT03f. grazie per info Mauro

**940616**

**OE3JPC (II72c)** wkd: 0527 UR5LNR RJ20e, 0530 UT7LK SK, 0538 UR5LX RK42g. vln dk fr info, Johannes

**OE6IWG (HH47j)** wkd: 0534 UR5LNR RJ20e, 0542 UR5LX RK11e. vln dk fr info, Walter

**RX6AKO (SE07e)** wkd: DL9USA HL. спасибо за инфо Геннады

**940618**

**I4YNO (FE25e)** wkd: G6LEU XK16f, G8ZVM. Worked via **FAI:** EA1FH WD40c, QTF 290deg, rpts 41/51, hrd the same day F9HS AD43a very strong, same QTF of 290deg. Grazie per info, Alex

**IK5FTQ (FD05c)** wkd: 1817 EI4DQ VL20a, 1824 G6LEU XK66g, 1848 EA1FH WD40c. grazie per info Roberto

**IW5ACP (FD05c)** wkd: 1820 EI4DQ VL20a, 1826 G6LEU XK66g. grazie per info Mauro

**RX6AKO (SE07e)** wkd DL8AKI/p FL DF2JQ DL44h, DF0CI FL52g.спасибо за инфо Геннады

**940619**

**DK1VI (EJ54f)** wkd: 1103 EA7TL XW, 1104 EA7GBG, 1105 EA7BIH ZX12f. vln dk fr info, Ernst

**I4YNO (FE25e)** wkd: CT1WW WB63b, EA1KV VC67a, EA1YV VC57h. grazie per info, Alex

**940620 IK5FTQ (FD05c)** wkd: 1526 CT4KQ WA21e. grazie per info Roberto

**940622**

**DK1VI (EJ54f)** wkd: 1836 CT1WW WB63c, 1900 EB1FCP VB26j. vln dk fr info, Ernst

**940622**

**DK8LV (   )** wkd: 1823 CT1DIN WA43e, 1947 EA1KV VC67a, 1820 EA4EHI WZ44d, 1813 EA4LY YA vln dk fr info, Stephan

**PA3BIY (CM72c)** wkd: 1621 EA1DIH VB06j, 1633 EA1TA VD58a, 1810 CT1DIN WA34e, 1812 EA7ALL YX11e, 1820 EA4LY YA45d, 1821 EB4DCI YJ11g, 1935 EA1AFP VC, 1940 EA1DKV VD49f, 1941 EA1BLA VD39e, 1945 CT1CLR VA22g, 1947 CT1FAK VA, 1950 EA1AEN VC77c, 1952 EA1TA VD58a, 1954 EB1GJP VD58b, 1958 EA1CZF VD18g, 2000 EB1DRJ, 2000 EB1DZV. hrd CT1CAD (WX), EA4EHI (WZ44d), EA4EOZ, EA1BFZ (YB), EA7AEN (YY01h), EA4AL (YA) bedankt voor info Peter

**940624**

**EB7/DG7AAF/p (YW)** wkd: 1712 DL5MAE FI60f, 1714 DL5MCG FI55a, 1714 DK9RL GJ71j, 1714 DC6PX EI80h, 1717 DJ2RE EJ14f, 1717 DL3MGK FI, 1720 DJ7GK/a GJ, 1720 DJ3TF FJ50g, 1726 DG5RN FJ, 1728 DF0XC GJ, 1730 OK1DTC GK39h, 1730 DJ5RE FJ, 1730 DK6NJ FJ, 1738 OK1UBR GJ, 1745 DF1NP/a FI, 1745 DL1GFH EH, 1745 DL5GAC EH18d, 1745 DL5MAM FI79j, 1745 DG7MHR FH22a, 1750 DL9MCD FH, 1805 DL8MFN GI51b, 1810 DL2RMC GI.
vln dk fr info, Winfried

**I4YNO (FE25e)** wkd: EA4BKY YA42d, EA4BPJ YA42d, CT1DL VY15e, EA5DY YA41e, EB4YY XA60d, EA7GBG WX57b, CT1APU WZ13c, CT1BGE VY, CT1CRR VY15j, EA4LY YA42f, EA7WM WX66g. grazie per info Alex

**IW5ACP (FD05c)** wkd: 1730 CU1CB NW, 1742 CT1DDW WA21e, 1746 EA1EPM XB08f, 1747 CT1DQM WA, 1819 EB4BFQ YA42b, 1832 EA4OL YZ11h. grazie per info Mauro

**OE6IWG (HH47j)** wkd: 1801 EA7AEN YY01h, 1813 EB4OL YZ11h, 1818 EA4LY YA42f, 1820 EA3AEL/p AC, 1826 EA4PX YZ11g, 1828 EA5DY YA41e, 1834 EA3ECE AB15c. vln dk fr info, Walter

**PA3BIY (CM72c)** wkd: 1750z EA7BHO YX62c, 1848 7X2DS BW28d, 1922 EA4RN XA60d, Missed EA9AI by 5 minutes! bedankt voor info Peter

**940626**

**EB7/DG7AAF/p (YW)** wkd: 1650 YU1WP JE34b, 1656 YU7EW KF24f, 1702 YU7BCX KF24f, 1704 YU7ON KE, 1714 YU1VG JE19e, 1715 YU1WP JE34b. vln dk fr info, Winfried

**940702**

**DK8LV (   )** wkd: 1551 UA3QR TM75e, 1606 UR4EWA QI78f. vln dk fr info, Stephan

**PA3BIY (CM72c)** wkd: 1544 UT7VF QI26g, 1545 UT4EQ RI46g, 1546 UR3EE SI72a, 1547 UT5EU/a RJ80d, 1550 UR3EP SJ71g, 1557 UA3QR TM75e, 1559 UE3PFW SN47d, 1603 UR5BAE MJ38d, 1607 UU4JXA QE39j, 1618 UT5LX RK50j, 1850 LZ2FO LD05a, 1852 LZ6Z LD47j, 1900 LZ1ZB LC27a. **hrd** U5YM (MI), UT3LL (SK), UR3GS (SJ), RA3LW (PO26g), UR4EWA (QI78f), UT7GA (QG), LZ2XU (MD44j), YU7OL, LZ4KAC, LZ2FR (LD). bedankt voor info Peter

**940813 DL8EBW (DL66a)** wkd: 1011 9H1GB HV13h, 1013 9H1CD HV03d. vln dk fr info, Guido

Please submit your Es reports preferably in machine readable form. You may do so using the following **magnetic media:**
5 1/4" or 3 1/2" 720K TOS or MS-DOS (please no HD coating)

Further you can report to me by **E-Mail:** dk3uz@iSYS-hh.isys.net
or via **Packet Radio:** DK3UZ @ DB0HHT.#HH.GER.EU

vy 73, Eddi

# Aurora News

Editor: Edmund Ramm, DK3UZ

**DH6JT (DL34b)** wkd via Aurora on 144MHz in CW:

**941029**

| | | | | | |
|---|---|---|---|---|---|
| 1447 | GM0NAI | XP18h | 53a | 53a | 15 |
| 1457 | OZ1GML | FP79b | 55a | 55a | 35 |
| 1502 | SM6CMU | FR50c | 59a | 55a | 15 |
| 1511 | GM4ISM | YP21h | 55a | 55a | 35 |
| 1526 | DJ2XS | FN41g | 55a | 55a | 35 |
| 1534 | G3JRW | AM49a | 55a | 55a | 30 |
| 1536 | G4ASR | YL06h | 55a | hrd | 30 |
| 1537 | SM7RYO | HQ72j | 55a | hrd | 30 |
| 1539 | DL8EBW | DL47g | 58a | hrd | 30 |

vln dk fr info, Thorsten

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**DJ2XS (FN41g)** wkd via Aurora on 144MHz in CW:

**941003**

| | | | | | |
|---|---|---|---|---|---|
| 1420 | SM5DIC | IT14c | 55a | 59a | 0 |
| 1430 | DJ6XV | DL25c | 51a | 53a | 0 |
| 1435 | LA2PHA | DS74j | 53a | 55a | 350 |
| 1440 | DL8EBW | DL66a | 53a | 55a | 350 |
| 1455 | DL2SUD | FM29h | 53a | 53a | 350 |
| 1500 | OZ1GML | | 51a | 51a | 350 |
| 1700 | LA1GCA | DU38f | 55a | 55a | 340 |
| 1705 | SM5EFP | HT50e | 55a | 58a | 0 |

**941029**

| | | | | | |
|---|---|---|---|---|---|
| 1415 | GD4IOM | XO67d | 55a | 53a | 350 |
| 1420 | G3IMV | ZL07h | 57a | 57a | 350 |
| 1423 | G4ASR | YL06h | 55a | 57a | 340 |
| 1425 | DL1KDA | DK23g | 55a | 56a | 350 |
| 1430 | GM4AJV | | 55a | 55a | 350 |
| 1435 | SK5CG | IU69j | 55a | 55a | 0 |
| 1437 | RA3LE | QO21h | 55a | 55a | 20 |
| 1440 | DF7KF | DK13b | 57a | 57a | 0 |
| 1445 | UA1WAM | PQ53b | 55a | 57a | 20 |
| 1448 | SP2HV | JO | 55a | 55a | 20 |
| 1450 | G0JDL | | 55a | 55a | 0 |
| 1500 | G0CDA | | 53a | 55a | 0 |
| 1505 | G3JRM | AM49a | 55a | 54a | 0 |
| 1508 | LA3PK | FT05e | 57a | 55a | 0 |
| 1510 | SM6MKH | GS68c | 55a | 55a | 0 |
| 1515 | LA1YFA | FT65b | 55a | 55a | 350 |
| 1518 | SM4SCF | GT15b | 59a | 59a | 350 |
| 1522 | SM4JEW | GT59b | 55a | 57a | 0 |
| 1525 | DH6JT | DL34b | 55a | 55a | 0 |
| 1530 | SM6FOV | HS21a | 59a | 59a | 10 |
| 1535 | SM5DYC | IT04g | 53a | 55a | 10 |
| 1538 | G4CRT | | 55a | 55a | 0 |
| 1540 | DL9FCM | EL69h | 55a | 51a | 0 |
| 1545 | I4XCC | GD03d | 55a | 55a | 0 |
| 1555 | LA9OGA | FU14f | 55a | 55a | 0 |
| 1605 | LA0FX | EU35d | 55a | 57a | 350 |

**941031**

| | | | | | |
|---|---|---|---|---|---|
| 1540 | LA8SJ | FT24g | 55a | 55a | 360 |
| 1545 | SM5BSZ | IS10d | 55a | 44a | 360 |
| 1600 | LA2RZ | CU47b | 55a | 53a | 350 |

vln dk fr info, Matthias

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**DK1VI (EJ54g)** wkd via Aurora on 144MHz in CW:

**941029**

| | | | | | |
|---|---|---|---|---|---|
| 1548 | EI4DQ | VL20a | 51a | 53a | 330 |

vln dk fr info, Ernst

**DK2PH (EL03d)** wkd via Aurora on 144MHz in CW:

| | | | | | |
|---|---|---|---|---|---|
| **941029** | | | | | |
| 1524 | RA3LE | QO21h | 55a | 55a | 40 |
| 1535 | UA1WAM | PQ53b | 57a | 57a | 40 |

vln dk fr info, Hans

**DK8LV** ([illegible]) wkd via Aurora on 144MHz in CW:

| | | | | |
|---|---|---|---|---|
| **940111** | | | | |
| 1720 | SM5BSZ | IT44e | 57a | 55a |
| 1723 | SM6LPG | GS59b | 57a | 55a |
| 1756 | LA2RZ | CU47b | 55a | 55a |
| **940205** | | | | |
| 2306 | LA9BM | EU32g | 54a | 52a |
| 2313 | LI2OWG | FU | 55a | 55a |
| 2315 | SM5BSZ | IT44e | 57a | 57a |
| 2326 | LA3NGA | ET79a | 55a | 55a |
| 2335 | GM4YXI | YR60a | 58a | 52a |
| 2348 | GM4ILS | YR24e | 55a | 55a |
| 2354 | SM0ELV | IT49a | 55a | 53a |
| **940206** | | | | |
| 0039 | OH2BNH | MU55d | 55a | 55a |
| 0056 | SM0PYP | IT | 57a | 58a |
| 1650 | G4PIQ | AL16a | 55a | 55a |
| 1653 | SK6HD | GS68d | 55a | 55a |
| 1656 | DL9GKA | GN08b | 51a | 41a |
| 1658 | LA2DK | EU23d | 55a | 55a |
| 1702 | SM0BTS | IT50e | 44a | 55a |
| 1705 | LA8WF | FT03e | 59a | 57a |
| 1708 | GM4ILS | YR24e | 59a | 55a |
| 1712 | SK7GC | HS | 55a | 44a |
| 1716 | G3NBQ | YN06g | 44a | 51a |
| 1722 | LA5LBA | FT78a | 59a | 55a |
| 1732 | G4SWX | AM77j | 55a | 57a |
| 1737 | PA3DCO | CM76a | 55a | 55a |
| 1740 | LA9VDA | FT | 59a | 57a |
| 1746 | DL2LAR | EO46h | 58a | 56a |
| 1749 | DL2OM | DK38j | 58a | 57a |
| 1807 | SM4ANQ | HU77h | 58a | 57a |
| 1809 | G4ASR | YL06h | 55a | 55a |
| 1815 | G4ASR | YL06h | 55a | 31a |
| 1833 | GM4JJJ | YQ73c | 55a | 31a |
| **940209** | | | | |
| 1652 | LA2RZ | CU47b | 53a | 53a |
| 1718 | OH5NZO | NU05j | 53a | 53a |
| 1947 | SM5BSZ | IT44e | 55a | 54a |
| **940210** | | | | |
| 1804 | SM6SIF | GR03c | 55a | 55a |
| **940211** | | | | |
| 1830 | SM5CTV | IS32g | 54a | 55a |
| 1945 | LA2AB | FT03f | 55a | 55a |
| **940213** | | | | |
| 1645 | GM4YXI | YR60a | 54a | 53a |
| 1652 | OH2NHP | MU64a | 55a | 55a |
| 1656 | LA2PHA | DS74j | 53a | 52a |
| 1659 | SM5BSZ | IT44e | 59a | 58a |
| 1704 | SM6RTM | HS41e | 55a | 54a |
| 1709 | OH2BNH | MU55d | 55a | 55a |
| 1744 | LA2RZ | CU47b | 55a | 55a |
| 1802 | SM0FMT | IT50j | 55a | 55a |
| 1807 | LA4ND | FT | 55a | 56a |
| 1813 | LA6VBA | ES26g | 56a | 56a |
| 1817 | GM3WOJ | XR20e | 52a | 55a |
| 1819 | SM5CTV | IS32g | 57a | 57a |
| 1821 | G3NBQ | YN06g | 53a | 52a |
| **940214** | | | | |
| 2242 | LI2OWG | FU | 53a | 51a |
| **940307** | | | | |
| 1600 | GM3JFG | XR30b | 57a | 56a |
| 1608 | OH2LNM | MU65a | 55a | 55a |
| 1612 | OH1MVO | LU66j | 55a | 55a |
| 1615 | SM6OPX | FS58f | 55a | 54a |
| 1619 | SM5MIX | HS66g | 59a | 59a |
| 1724 | SM1BSA | JR22e | 55a | 45a |
| 1727 | SM5CAK | HS36h | 59a | 59a |
| 1732 | DL9GKA | GN08b | 57a | 55a |
| 1737 | DH0YAZ | EL03d | 52a | 519 |
| 1743 | SM6FOV | HS | 52a | 57a |

## DK8LV (      ) contd.:

**940307**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1622 | SM5EFP | HT50e | 57a | 58a | 1751 | LA8YIA | FT | 55a | 55a |
| 1635 | LA5KO | FT13g | 57a | 56a | 1805 | SK5AA | IT23c | 54a | 52a |
| 1638 | DL9GJW | FO80a | 57a | 55a | 1906 | OZ6OL | GP42e | 54a | 55a |
| 1658 | GM4CXM | XP09g | 55a | 55a | 1956 | LA8SJ | FT24g | 57a | 56a |
| 1703 | GM4UFD | ZR32f | 55a | 54a | 1959 | ON4ANT | CK21h | 57a | 57a |
| 1709 | DK9OY | FM41c | 55a | 51a | 2006 | SK7GC | HS | 57a | 56a |
| 1711 | LA4ND | FT | 56a | 57a | 2012 | G3NBQ | YN06g | 43a | 56a |

**940309**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1555 | LA2RZ | CU47b | 56a | 55a | 2049 | SM0ELV | IT49a | 56a | 55a |
| | | | | | 2117 | LA2PHA | DS74j | 54a | 52a |

**940315**

| | | | | |
|---|---|---|---|---|
| 1638 | LA3EDA | FU51d | 55a | 54a |

**940530**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1513 | SM6UMO | GS | 57a | 55a | 1538 | LA1KHA | ET68c | 54a | 55a |
| 1521 | SM0FMT | IT50j | 55a | 53a | | | | | |

vln dk fr info, Stephan

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## DL3YEE (EM63c) wkd via Aurora on 144MHz in CW:

**941029**

| | | | | | |
|---|---|---|---|---|---|
| 1442 | OZ7RD | FQ41h | 55a | 55a | 30 |

vln dk fr info, Klaus

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## DL8BDU (EN71f) wkd via Aurora on 144MHz in CW:

**940409**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1445 | SK4MPI | HU46d | 52a | B | 0 | 1453 | SM0ELV | IT49a | 41a | 53a | 30 |
| 1445 | GB3LER | ZU65f | 41a | B | 0 | 1501 | SM0FMT | IT50j | 52a | 52a | 30 |
| | | | | | | 1512 | LA4ND | FT06j | 51a | 55a | 30 |

**940411**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1645 | SK4MPI | HU46d | 41a | B | 0 | 1645 | GB3LER | ZU65f | 41a | B | 0 |
| | | | | | | 1650 | LA3DV | ET20e | 42a | hrd | 0 |

**940501**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1755 | GM4YXI | YR60a | 59a | 57a | 0 | 1807 | G3NBQ | YN06g | 31a | 52a | 0 |

**940503**

| | | | | | |
|---|---|---|---|---|---|
| 1400 | SK4MPI | HU46d | 41a | B | 0 |

vln dk fr info, Klaus

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## DL8EBW (DL66a) wkd via Aurora on 144MHz:

**941003**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1440 | DJ2XS | FN41g | 55a | 53a | 40 | 1441 | LA2PHA | DS74j | 59a | hrd | 40 |

**941029**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1405 | OZ1DOQ | GP24f | 57a | 57a | 30 | 1447 | OZ1GML | FP79b | 57a | 57a | 35 |
| 1408 | GM0NAI | XP18h | 55a | 55a | 30 | 1456 | OZ1IKU | FQ62g | 55a | 55a | 35 |
| 1411 | GD4IOM | WO67d | 59a | 55a | 30 | 1501 | SM6CMU | FR50c | 57a | 57a | 25 |
| 1421 | SM7SCJ | GP47d | *59a* | *59a* | 40 | 1532 | SM7RYO | HQ72j | *57a* | *57a* | 30 |
| 1422 | OZ3SW | GP11a | *59a* | *54a* | 40 | 1542 | SP2HV | JO43d | 55a | 55a | 30 |

**DL8EBW (DL66a)** contd.:

**941029**

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1425 | DL7VBW | GM37c | 55a | 55a | 40 | 1549 | G3PJW | | 55a | 55a | 25 |
| 1436 | GM4OGI | YP02a | *59a* | *59a* | 30 | 1554 | PA3BIY | CM72c | 55a | 57a | 40 |

Hrd also: UA1WAM, RA3LE and a DL from FI(!) also a lot of G, GM, OZ, SM and DL

vln dk fr info, Guido

**ON4FZ (BK08b)** wkd via Aurora on 144MHz in CW:

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **941029** | | | | | 1532 OZ1KSN | FR42b | 56a | 56a |
| 1435 | OZ6ABA | FR42e | 59a | 57a | 1534 OZ1MAD | FR42b | 56a | 56a |
| 1445 | G4FIX | ZO33f | 55a | 55a | 1542 GM4WJA | YR24e | 59a | 57a |
| 1526 | GM4DMA | ZR31f | 58a | 55a | bedankt voor info Georges | | | |

**PA3BIY (CM72c)** wkd via Aurora on 144MHz in CW:

**931025**

1755 SM5BSZ IT44e 55a 55a

**931201**

1658 SM5BSZ IT44e 57a 56a

**940206**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 0023 | LA3NGA | ET79a | 55a | 57a | 1608 | DL6KR | DK26j | 53a | 55a |
| 0025 | GM4YXI | YR60a | 59a | 59a | 1623 | UA1WAM | PQ53b | 53a | 55a |
| 1555 | SP1JVG | IO45b | 56a | 55a | 1744 | OH3EX | MU24b | 53a | 53a |

**940207**

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | 0033 | GM0GMD | YQ61g | 53a | 54a |
| 0015 | GM4CXM | XP09g | 54a | 53a | 0050 | LA3NGA | ET79a | 53a | 54a |

**940402**

2215 SM5BSZ IT44e 56a 57a

**940530**

2245 SM5BSZ IT44e 55a 56a 292

bedankt voor info Peter

## 70cm 70cm 70cm 70cm 70cm 70cm 70cm 70cm 70cm 70cm 70cm

**DL3YEE (EM63c)** wkd via Aurora on 432MHz in CW:

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **941029** | | | | | | 1449 | OZ1FDH | GP23h | 55a | 55a | 30 |
| 1446 | OZ7IS | GP22j | 55a | 55a | 30 | 1458 | OZ1DOQ | GP24f | 55a | 55a | 30 |

vln dk fr info, Klaus

Please submit your Aurora reports preferably in machine readable form. You may do so using the following **magnetic media:**

5 1/4" or 3 1/2" 720K TOS or MS-DOS (please no HD coating)

Further you can report to me by **E-Mail:** dk3uz@iSYS-hh.isys.net

or via **Packet Radio:** DK3UZ @ DB0HHT.#HH.GER.EU

vy 73, Eddi

# News & Comments

Editor: Klaus Tiedemann, DL4EBY

## 144 DX-Activity-Contest 1994

**DL8EBW, Guido**, möchte daran erinnern, daß die Logs für 1994 bis zum 31.01.95 bei ihm eintreffen sollten, da es sonst wie im Vorjahr wieder zu leichten Verzögerungen in der Auswertung kommen kann! Logblätter und Großfelderkarte gegen SASE (Adresse siehe unten).

**DL8EBW, Guido writes:**

After some good openings on VHF, I like to inform you again, that the logs for the 144MHz-DX-Activity-Contest 1994 must be received until 31. Jan. 1995. Logsheets and square maps are available at DL8EBW (send SASE).

### Regeln, Rules:

Object of this contest is to activate the 144 band within the meaning of DX buisness, such as DXpedition or hunting up propagation phenomenas. The task is, during one calendar year (01.Jan - 31.Dec), to work stations in distances from 500 Km onwards, and squares as much as possible!

**Classes:**

- A - **PHONE** - For stations working phone exclusively. SSB and FM mode valid.
- B - **CW** - Exclusive telegraphie class.
- C - **MIXED** - This class is for stations working both phone and telegraphy.

You may choose the category where you will start yourself. If you wish, you may participate in all classes, but in this case seperate logs for each class are necessary!

**QSO-Points:** Every QSO on 144 MHz with a station in a minimum distance of 500 Km from the current QTH counts one QSO-point. A QSO with a station counts once during the contest period of one calendar year. Double QSOs in that period are not valid. Only if you change your own square, or the station you have worked before changes its square (DX-Pedition, portable...) you may count it as one QSO-point again (provided QRB 499 Km, of course). QSOs via satellites, repeaters etc. are not valid! Also EME-work does not count in this contest!

**Multiplier:** The mutilplier is the total number of different squares worked in one contest period. That may include your own square (!), squares in low distances (less than 500 Km) and squares you will work on your 2. QTH, 3. QTH... provided, they are not worked before from your home. It should be possible for each participant, to avoid double QSOs from a certain, own square by writing a checklist. These checklists, one for each location you were active in during the year, should include: own call, square, call and square of worked station, date and (as far as known) kind of propagation. Please add a square map (available with SASE to DL8EBW) with declaration of total of squares multiplied with total number of QSO-points (1. QTH + 2. QTH...) and of your total result:

**Multiplier x QSO-points = Total**

The square map should give us an statistical overview on your work and the propagation in the period of the contest in your area. Contest evaluation will be done up to the end of February. Therefore it is necessary to have your logs latest until 31 Jan. of the following year in the contest managers mail:

VHF-DX Group DL-West, c/o DL8EBW, G.Juenkersfeld, Geibelstr.13, D-42327 Wuppertal.

The first three stations of each section will receive certificates of their work! The results will be published in the wellknown VHF-magazines and via packet radio. If you pass a SASE with your log,

## DUBUS BBS:

**DUBUS mailbox service information:**

- **Tel.: (++ 49 30 455 76 25)**
- **Speed: up to 16800/ARQ/V42bis. Speed of calling modem will be recognized automatically.**
- **Access for all who use their call sign.**
- **Box-Operator: DL7APV or DL4EBY**
- **PE1DAB sends the sked database 2m&up from the K4PKV mailbox always in time (Every Monday).**

**Services:**

- **DUBUS News**
- **Technical Software**
- **EME Skeds Database for 144&432&up**
- **EME Sked Utilities (Programs)**
- **EME Contest Rules (European & ARRL)**
- **European Contest Schedules**
- **10GHz Active Station List, European Beacon List, 432&up**

you will receive the results also via mail! Good success, Guido!

**PA3BIY writes:** 1. **Articles versus Reports**. The technical articles in DUBUS are of a high quality, and I always read them with great interest. Still, propagation reports have always facinated me. Specially the 144 MHz Es, MS and aurora reports. The last few magazines however have seen a shift from reports to technical articles. Although I appreciate them very much, could not at least once or twice a year DUBUS magazine be filled with a decent amount of propagation reports?

*[Comment:That always depends on the openings and activity; see the number of tropo reports this issue! The editor]*

2. **Skeds via PACKET?!** Although not QRV on Packet Radio (PR) myself, this year I wanted to try to arange some skeds for a starting MS amateur (PE1IKX) via PR with the help of PE1JCG (who is active on PR). So in mid July I have send 10 messages (all for the Perseids). By August 11 **nobody** had responded yet. In fact so far (I write this in Sept.) Nobody has resonded at all! Most people I send messages to had advertised themselves on PR, asking for skeds. **What is wrong here??** Do messages not arrive, or is it plain rudeness not to answer (even a "*sorry NO sked*" is an answer!!)? Please your comment on this phenomena! Good dx and 73's, Peter, PA3BIY.

(P. Hoefsloot, Lisdodde 3, NL-2631DJ Nootdorp, Netherlands, Tel.: +3117319601)

**Somewhere in the North there is this liquid cooled power device to warm the heart and the body during the polar night.**

You are welcome to send in your reports and articles for the columns **Hints & Kinks**, **Computer News**, **EME News**, and **News & Comments** (the number of columns coming back to Berlin is still growing..) via electronic mail or Packet radio or disk, or upload to the DUBUS BBS...

- EMail (Internet): klaus@netmbx@netmbx.de or klaus@afutub.extern.tu-berlin.de
- Packet Radio: DL4EBY@DB0GR.DEU.EU
- DUBUS Mailbox (new software!) at +49-30-4557625 Thanks, Klaus.

# *Kitchens Corner*

*by DJ9BV*

# Fraise de Veau
# Agnello in Ragù

## Fraise de Veau

This is a traditional recipe from Haute Savoie, eastern France.

Cook fraise in hot water for 10 minutes and remove the grease. Cut in slices and keep apart. Roast onions in butter and oil, put fresh potatoes into it and let it cook for 30 minutes. Add fraise and cook for another 30 minutes. Don't use too much power. Add salt and pepper.

As an entry prepare a green salad. Use escarol (Endive). Prepare sauce from vinegar, some garlic, oil and pepper and salt. Wash salad with water, dry it in a hydro-extractor and mix it with the sauce. Serve before the main coarse.

Wine could be a red Beaujolais or a Gamay, which is based on the same type of grape in fact.

Thanks to Betty, F6IOC, for this nice recipe.

## Agnello in Ragù

This is a traditional recipe from Apulia/Italy.

Cut lamb into pieces and roast in butter until is getting brown. Squeeze garlic, put together with salt, laurel, rosemary and thyme. Put it to the meat and add red wine. Stew for 30 minutes with cover closed. Cut paprika, peel onions and put it to the meat. Stew for another 30 minutes. Peel tomatoes, put them to the ragu and stew another 10 minutes. Before serving 'tune' the ragù with salt and pepper and remove rosemary and laurel.

Rice (Basmati!) or fresh Italian bread is a good companion. Also the salad described above can be a good entry.

| Fraise de Veau | |
|---|---|
| **Item** | **Quantity [g]** |
| Stomache of Veal ('Frai-se') | 500 |
| Onions | 4 |
| Potatoes | 1000 |
| Butter | |
| Oil | |
| Green Salad (Endive) | |
| Garlic | |
| Vinegar | |
| Pepper | |

| Agnello in Ragù | |
|---|---|
| **Item** | **Quantity [g]** |
| Lamb | 1000 |
| Onions | 400 |
| Green Paprika | 500 |
| Tomatoes | 200 |
| Butter | 30 |
| Laurel | 3 leaves |
| Rosemary | |
| Garlic | 1 Glove |
| Thyme | |
| Pepper | |
| Salt | |
| Red wine | 500 ml |

Good appetite!

# DUBUS Toplist

Editor: Norbert Goettsche, DL8LAQ

## DUBUS 50 MHz Top List

| NR | CALL | WW | EU | WK | TR | AU | MS | ES | F2 |
|---|---|---|---|---|---|---|---|---|---|
| 1 | PA0RDY | JO22 | CM | 593 | 725 | 1617 | 1597 | **** | 16320 |
| 2 | G4IGO | IO80 | YK | 583 | 577 | 1308 | 2528 | 6970 | 16188 |
| 3 | ON4KST | JO20 | CK | 581 | 652 | 1415 | 1509 | 7920 | 16498 |
| 4 | ON4ANT | JO20 | CK | 551 | 710 | 1757 | 1695 | 7243 | 16547 |
| 5 | ON4GG | JO20 | CK | 534 | 710 | 1757 | 1695 | 7243 | 16547 |
| 6 | DL7QY | JN59 | FJ | 512 | 741 | 1665 | 2186 | 6900 | 16353 |
| 7 | GW4LXO | IO81 | YL | 500 | 300 | 650 | 1200 | 7500 | 10000 |
| 8 | G6HKM | JO01 | AL | 456 | 347 | 1883 | 780 | 5674 | 16112 |
| 9 | SM6CMU | JO57 | FR | 424 | 762 | 1452 | 1642 | 5922 | 0 |
| 10 | F1GTU | JN05 | AF | 418 | 699 | 815 | 1421 | 3268 | 16400 |
| 11 | DL8HCZ | JO53 | FN | 412 | 365 | 1250 | 1356 | 3350 | 0 |
| 12 | I4XCC | JN63 | GD | 394 | 492 | 0 | 1427 | 3349 | 18627 |
| 13 | PA2TAB | JO32 | DM | 387 | 610 | 1370 | 1809 | 5797 | 15339 |
| 14 | PA3FYM | JO22 | CM | 375 | 1238 | 2019 | 0 | **** | 16373 |
| 15 | G8VR | JO01 | AL | 365 | 760 | 2154 | 1290 | 8470 | 16416 |
| 16 | OK1MAC | JN79 | HJ | 335 | 0 | 0 | 0 | 0 | 0 |
| 17 | DL9GU | JN49 | EJ | 327 | 721 | 450 | 0 | 8500 | 15625 |
| 18 | DL7ARM | JO62 | GM | 315 | 909 | 1189 | 1245 | 8324 | 15817 |
| 19 | F8OP | JN26 | CG | 314 | 631 | 1023 | 1369 | 5508 | 13547 |
| 20 | OK1DDO | JO60 | GK | 285 | 620 | 1423 | 1340 | 6100 | 13300 |
| 21 | SP6GZZ | JO81 | IL | 268 | 515 | 0 | 1826 | 7619 | 0 |
| 22 | OK1IBL | JO60 | GK | 266 | 577 | 1265 | 1350 | 6920 | 11500 |
| 23 | DL3YEE | JO42 | EM | 244 | 540 | 1056 | 1300 | 2700 | 13053 |
| 24 | DL8LAQ | JO43 | EN | 228 | 0 | 0 | 0 | 0 | 0 |
| 25 | G6LEU | IO70 | XK | 214 | 700 | 750 | 0 | 0 | 0 |
| 26 | ES1CW | KO29 | MT | 201 | 1052 | 1726 | 2841 | 3311 | 4343 |
| 27 | OK1VBN | JN78 | HI | 200 | 455 | 0 | 0 | 4010 | 0 |
| 28 | DL5BBL | JO42 | EM | 199 | 414 | 1008 | 0 | 3165 | 5863 |
| 29 | OK1FFD | JO60 | GK | 195 | 550 | 1247 | 0 | 6060 | 13300 |
| 30 | DL7YS | JO62 | GM | 195 | 342 | 461 | 969 | 3547 | 8767 |

## DUBUS 144 MHz Top List

| NR | CALL | WW | EU | WK | TR | AU | MS | ES |
|---|---|---|---|---|---|---|---|---|
| 1 | DL3BWW | JO72 | HM | 619 | 2243 | 2034 | 2295 | 2782 |
| 2 | DL8HCZ | JO53 | FN | 554 | 1615 | 1976 | 2096 | 3527 |
| 3 | PA0RDY | JO22 | CM | 545 | 1582 | 1979 | 2272 | 2819 |
| 4 | SM6CMU | JO57 | FR | 534 | 1760 | 1928 | 2280 | 2540 |
| 5 | SM6AFH | JO66 | GQ | 531 | 1730 | 1554 | 2010 | 2330 |
| 6 | PA3BIY | JO22 | CM | 530 | 1550 | 2026 | 2205 | 3143 |
| 7 | OH5LK | KP30 | NU | 517 | 1962 | 2041 | 2235 | 2891 |
| 8 | DK6AS | JO52 | FM | 516 | 1460 | 1885 | 2510 | 2260 |
| 9 | DF8LC | JO53 | FN | 514 | 2105 | 2045 | 2202 | 3291 |
| 10 | DK9OY | JO52 | FM | 510 | 1651 | 1947 | 2208 | 2434 |
| 11 | SP6GZZ | JO81 | IL | 506 | 1670 | 1794 | 2017 | 2717 |
| 12 | SP9EWU | JO90 | JK | 489 | 1710 | 1927 | 2154 | 2531 |
| 13 | OE3JPC | JN88 | II | 472 | 1584 | 1821 | 2128 | 2769 |
| 14 | I2FAK | JN45 | EF | 469 | 1750 | 1508 | 2405 | 2995 |
| 15 | DL8EBW | JO31 | DL | 453 | 1454 | 1918 | 2029 | 2214 |
| 16 | DL2NWK | JO63 | GN | 441 | 1819 | 1956 | 1991 | 2251 |
| 17 | DL8LAQ | JO43 | EN | 438 | 1376 | 1806 | 1934 | 3302 |
| 18 | DL7UTS | JO62 | GM | 430 | 1516 | 1379 | 2057 | 2312 |
| 19 | UV1AS | KN59 | PT | 427 | 1709 | 1905 | 2271 | 2547 |
| 20 | DL5BCU | JO43 | EN | 421 | 1479 | 1928 | 2010 | 2538 |
| 21 | RA3YCR | KO73 | RN | 420 | 1835 | 1964 | 2255 | 2429 |
| 22 | I4XCC | JN63 | GD | 416 | 1177 | 1803 | 2275 | 3257 |
| 23 | OM3AU | KN08 | KI | 401 | 2128 | 1756 | 2065 | 2513 |
| 24 | PA3FOC | JO21 | CL | 400 | 1373 | 2010 | 2142 | 2179 |
| 25 | DL5DTA | JO61 | GL | 399 | 1344 | 1578 | 1907 | 2057 |
| 26 | DL7AKA | JO62 | GM | 396 | 1747 | 1916 | 2065 | 3620 |
| 27 | SP5EFO | KO02 | KM | 392 | 1702 | 1982 | 2010 | 2626 |
| 28 | OK1MAC | JN79 | HJ | 389 | 1536 | 1681 | 1940 | 2511 |
| 29 | F8OP | JN26 | CG | 389 | 1228 | 1196 | 2028 | 2720 |
| 30 | I3LGP | JN65 | GF | 380 | 1335 | 1387 | 2020 | 3174 |
| 31 | UA3MBJ | KO88 | SS | 373 | 1560 | 2006 | 2573 | 2392 |
| 32 | ON4ANT | JO20 | CJ | 371 | 1420 | 1965 | 2124 | 2725 |
| 33 | HB9CRQ | JN47 | EH | 369 | 1404 | 1288 | 2060 | 2959 |
| 34 | ON4GG | JO20 | CK | 365 | 1420 | 1965 | 2124 | 2124 |
| 35 | F5FHI | IN97 | ZH | 355 | 1739 | 2051 | 2183 | 2735 |
| 36 | DL3AMA | JO51 | FL | 350 | 1785 | 1803 | 1925 | 2075 |
| 37 | OE3OKS | JN87 | IH | 349 | 1441 | 1273 | 1867 | 2788 |
| 38 | DL1SUN | JO53 | FN | 336 | 1824 | 1724 | 1845 | 2333 |
| 39 | DL7YS | JO62 | GM | 334 | 1512 | 1528 | 1826 | 2136 |
| 40 | G3LQR | JO02 | AM | 329 | 1776 | 2031 | 0 | 2406 |
| 41 | I4YNO | JN54 | FE | 326 | 1145 | 1374 | 1960 | 2243 |
| 42 | DJ1LP | JO64 | GO | 324 | 1347 | 1071 | 2058 | 2301 |
| 43 | EA1DVY | IN81 | YB | 323 | 1946 | 0 | 0 | 2064 |
| 44 | F6DKW | JN18 | BI | 320 | 1519 | 1602 | 2051 | 2755 |
| 45 | S53CAB | JN76 | HG | 319 | 1463 | 1530 | 2233 | 3356 |
| 46 | OK1DKS | JO70 | HK | 319 | 1230 | 1308 | 0 | 3530 |
| 47 | DK0OG | JN68 | GI | 311 | 1708 | 1722 | 2125 | 3320 |
| 48 | PA0RLS | JO22 | CM | 311 | 1350 | 1890 | 1890 | 2832 |
| 49 | DK1KR | JO53 | FN | 310 | 1481 | 2103 | 0 | 2026 |
| 50 | SP3MFI | JO91 | JL | 307 | 1697 | 1632 | 1802 | 2617 |
| 51 | UA3TCF | LO26 | WQ | 306 | 1131 | 1996 | 2498 | 2332 |
| 52 | SP9HWY | JO90 | JK | 303 | 1698 | 1928 | 0 | 2532 |
| 53 | DL6BF | JO32 | DM | 303 | 1542 | 1932 | 1452 | 2332 |
| 54 | IW1AZJ | JN35 | DF | 301 | 1105 | 1188 | 1904 | 2780 |
| 55 | DL8OBU | JO42 | EM | 297 | 1483 | 1866 | 1733 | 2159 |
| 56 | RW3RW | LO02 | UM | 297 | 1298 | 2098 | 1740 | 2834 |
| 57 | SP6GWB | JO80 | IK | 290 | 1780 | 1581 | 1875 | 2437 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 58 | UA3DHC | KO96 | TQ | 289 | 1766 | 1891 | 2180 | 2429 |
| 59 | F1FIH | JN23 | CD | 289 | 1305 | 999 | 1723 | 2934 |
| 60 | IN3TWX | JN56 | FG | 283 | 1100 | 0 | 1609 | 1750 |
| 61 | F1EAN | JN06 | AG | 282 | 1650 | 1420 | 0 | 2479 |
| 62 | LA8AK | JO38 | DS | 280 | 1496 | 1804 | 1804 | 2413 |
| 63 | G4IGO | IO80 | YK | 274 | 2761 | 1917 | 1903 | 2833 |
| 64 | SP2JXN | JO94 | JO | 274 | 1650 | 1690 | 0 | 2634 |
| 65 | UA4API | LO20 | WK | 271 | 1127 | 1820 | 0 | 0 |
| 66 | DB6BX | JO32 | DM | 270 | 1534 | 1541 | 1921 | 2059 |
| 67 | OK1FFD | JO60 | GK | 270 | 1388 | 1720 | 1937 | 2154 |
| 68 | PA0WWM | JO22 | CM | 268 | 1303 | 1839 | 1997 | 2212 |
| 69 | UA4NM | LO48 | YS | 265 | 1215 | 1850 | 2510 | 2290 |
| 70 | GW4LXO | IO81 | YL | 261 | 2750 | 1550 | 2000 | 2200 |
| 71 | OZ1IPU | JO57 | FR | 261 | 1387 | 1187 | 1566 | 2452 |
| 72 | UZ2FWA | KO04 | KO | 261 | 912 | 1759 | 2125 | 2010 |
| 73 | OK1HAG | JN79 | HJ | 260 | 1441 | 1749 | 1909 | 3463 |
| 74 | DK2BJ | JO30 | DK | 258 | 1476 | 1924 | 0 | 2205 |
| 75 | OK1IBL | JO60 | GK | 255 | 1438 | 1463 | 1750 | 3398 |
| 76 | F5HRY | JN18 | BI | 255 | 1239 | 1695 | 2038 | 2758 |
| 77 | DD0BI | JO33 | DN | 252 | 1565 | 1018 | 1102 | 2362 |
| 78 | F6CKZ | JN09 | AJ | 250 | 1552 | 1330 | 1725 | 3407 |
| 79 | DJ6LV | JO31 | DL | 250 | 1268 | 1880 | 1822 | 3130 |
| 80 | ON4KST | JO20 | CK | 245 | 1435 | 1612 | 0 | 2383 |
| 81 | PE1KHP | JO22 | CM | 241 | 1685 | 1214 | 1321 | 2010 |
| 82 | G6HKM | JO01 | AL | 241 | 1304 | 1555 | 1660 | 2269 |

## DUBUS 432 MHz Top List

| NR | CALL | WW | EU | WK | TR | AU | MS | ES |
|---|---|---|---|---|---|---|---|---|
| 1 | DJ9BV | JO43 | EN | 219 | 2154 | 1863 | 1440 | 0 |
| 2 | PA0RDY | JO22 | CM | 202 | 1979 | 1807 | 1376 | 0 |
| 3 | G3LQR | JO02 | AM | 198 | 2031 | 1613 | 0 | 0 |
| 4 | DL3BWW | JO72 | HM | 191 | 1547 | 1494 | 0 | 0 |
| 5 | PA0EZ | JO22 | CM | 189 | 1787 | 1445 | 0 | 0 |
| 6 | PA0WWM | JO22 | CM | 187 | 1547 | 1836 | 0 | 0 |
| 7 | F5FHI | IN97 | ZH | 184 | 1892 | 1280 | 1530 | 0 |
| 8 | UA6LGH | KN97 | TH | 182 | 2216 | 0 | 0 | 0 |
| 9 | DL8QS | JO43 | EN | 180 | 1513 | 1513 | 0 | 0 |
| 10 | DL7QY | JN59 | FJ | 173 | 1640 | 1848 | 1292 | 0 |
| 11 | DJ6MB | JO30 | DK | 171 | 1278 | 1733 | 0 | 0 |
| 12 | PE0AGO | JO32 | DM | 163 | 1702 | 0 | 0 | 0 |
| 13 | DK6AS | JO52 | FM | 161 | 1569 | 775 | 0 | 0 |
| 14 | F6DKW | JN18 | BI | 160 | 1519 | 0 | 0 | 0 |
| 15 | DB6BX | JO32 | DM | 156 | 1550 | 662 | 0 | 0 |
| 16 | F1EAN | JN06 | AG | 154 | 1493 | 0 | 0 | 0 |
| 17 | DB6NT/A | JO50 | FK | 153 | 1823 | 0 | 0 | 0 |
| 18 | G3XDY | JO02 | AM | 149 | 1350 | 1619 | 0 | 0 |
| 19 | OZ2OE | JO45 | EP | 148 | 2216 | 1020 | 0 | 0 |
| 20 | PA3DIJ | JO33 | DN | 148 | 2116 | 1010 | 0 | 0 |
| 21 | RA3YCR | KO73 | RN | 147 | 1671 | 1788 | 0 | 0 |
| 22 | DK1KR | JO53 | FN | 147 | 1400 | 1827 | 0 | 0 |
| 23 | SM0FZH | JO99 | JT | 143 | 1900 | 1218 | 0 | 0 |
| 24 | DF8LC | JO53 | FN | 143 | 1615 | 1361 | 0 | 0 |
| 25 | DH3NAN | JO50 | FK | 143 | 1437 | 1008 | 0 | 0 |
| 26 | SM6ESG | JO67 | GR | 142 | 1427 | 0 | 0 | 0 |
| 27 | SP6GWB | JO80 | IK | 141 | 1780 | 759 | 0 | 0 |
| 28 | SP6MLK | JO80 | IK | 141 | 1780 | 0 | 0 | 0 |
| 29 | DL1SUN | JO53 | FN | 136 | 1157 | 1071 | 0 | 0 |
| 30 | DL3YEE | JO42 | EM | 134 | 1574 | 1728 | 0 | 0 |
| 31 | OK1KIR/P | JO60 | GK | 130 | 1773 | 0 | 0 | 0 |
| 32 | SP9FG | JN99 | JJ | 130 | 1660 | 0 | 0 | 0 |
| 33 | SM7ECM | JO65 | GP | 129 | 1344 | 1068 | 0 | 0 |
| 34 | OH5LK | KP30 | NU | 124 | 1386 | 1196 | 0 | 0 |
| 35 | DL1BKK | JO43 | EN | 123 | 1193 | 565 | 0 | 0 |
| 36 | SP9EWU | JO90 | JK | 121 | 1544 | 1558 | 1664 | 0 |
| 37 | LA8AK | JO38 | DS | 119 | 1373 | 981 | 0 | 0 |
| 38 | G6HKM | JO01 | AL | 118 | 1289 | 281 | 0 | 0 |
| 39 | OE5VRL/5 | JN78 | HI | 116 | 1522 | 948 | 0 | 0 |
| 40 | G6RAF | IO92 | ZM | 115 | 1730 | 0 | 0 | 0 |
| 41 | DL4VCG | JN39 | DJ | 115 | 1335 | 0 | 0 | 0 |
| 42 | OZ1IPU | JO57 | FR | 113 | 1387 | 0 | 0 | 0 |
| 43 | F5PAU | IN88 | YI | 111 | 1630 | 0 | 0 | 0 |
| 44 | DJ6XV | JO31 | DL | 111 | 1128 | 976 | 0 | 0 |
| 45 | UA3MBJ | KO88 | SS | 110 | 1306 | 1541 | 0 | 0 |
| 46 | GW4LXO | IO81 | YL | 109 | 1550 | 0 | 0 | 0 |
| 47 | SP6GZZ | JO81 | IL | 109 | 1549 | 870 | 0 | 0 |
| 48 | DL7UTS | JO62 | GM | 109 | 1507 | 772 | 0 | 0 |
| 49 | HB9MIN/P | JN37 | DH | 109 | 1300 | 0 | 0 | 0 |
| 50 | SM6CMU | JO57 | FR | 108 | 1641 | 670 | 0 | 0 |
| 51 | SM6AFH | JO66 | GQ | 108 | 1315 | 1200 | 0 | 0 |
| 52 | DL6BCT | JO43 | EN | 107 | 1152 | 0 | 0 | 0 |
| 53 | PA0BAT | JO31 | DL | 105 | 1301 | 0 | 0 | 0 |
| 54 | DF9QX | JO42 | EM | 105 | 1136 | 721 | 0 | 0 |
| 55 | DC4XH | JO43 | EN | 103 | 1133 | 808 | 0 | 0 |
| 56 | UA3DHC | KO96 | TQ | 101 | 1596 | 1009 | 0 | 0 |
| 57 | HB9CRQ | JN47 | EH | 101 | 1010 | 0 | 0 | 0 |
| 58 | DG9NBT | JN49 | EJ | 100 | 1204 | 0 | 0 | 0 |
| 59 | UT7GA | KN66 | QG | 98 | 1877 | 0 | 0 | 0 |
| 60 | SP9HWY | JO90 | JK | 98 | 1398 | 1306 | 0 | 0 |
| 61 | OK1DKS/P | JO60 | GK | 98 | 1118 | 0 | 0 | 0 |
| 62 | DL0UL/P | JN48 | EI | 97 | 1238 | 0 | 0 | 0 |
| 63 | ON4GG | JO20 | CK | 96 | 1407 | 0 | 0 | 0 |
| 64 | ON4ANT | JO20 | CK | 96 | 1406 | 0 | 0 | 0 |
| 65 | DK0OG | JN68 | GI | 94 | 1351 | 745 | 0 | 0 |
| 66 | DL3AMA | JO51 | FL | 94 | 1015 | 1219 | 0 | 0 |
| 67 | DL2NWK | JO63 | GN | 92 | 1636 | 590 | 0 | 0 |
| 68 | DJ1LP | JO64 | GO | 91 | 1414 | 0 | 0 | 0 |
| 69 | DG5NEX | JN49 | EJ | 91 | 1187 | 0 | 0 | 0 |
| 70 | G4LRT | IO92 | ZM | 90 | 1394 | 410 | 0 | 0 |
| 71 | DK9RL | JN69 | GJ | 87 | 1185 | 0 | 0 | 0 |
| 72 | SP5EFO | KO02 | KM | 87 | 1120 | 1705 | 0 | 0 |
| 73 | DD0BI | JO33 | DN | 85 | 1259 | 0 | 0 | 0 |
| 74 | UY5HF | KN66 | QG | 84 | 1670 | 0 | 0 | 0 |
| 75 | F5HRY | JN18 | BI | 84 | 1222 | 583 | 0 | 0 |
| 76 | DK1VI | JN49 | EJ | 84 | 1125 | 870 | 0 | 0 |
| 77 | DC6DY | JO31 | DL | 83 | 1190 | 0 | 0 | 0 |
| 78 | DL5BCU | JO43 | EN | 83 | 1188 | 766 | 0 | 0 |
| 79 | DG0CR/P | JO50 | FK | 82 | 1048 | 759 | 0 | 0 |
| 80 | HB9AOF | JN36 | DG | 82 | 926 | 0 | 0 | 0 |
| 81 | DK2DB | JN48 | EI | 81 | 1331 | 0 | 0 | 0 |

## DUBUS 1296 MHz Top List

| NR | CALL | WW | EUWK | ODX |
|---|---|---|---|---|
| 1 | PA0EZ | JO22 CM | 121 | 1261 |
| 2 | PA0RDY | JO22 CM | 119 | 1286 |
| 3 | F5FHI | IN97 ZH | 115 | 1538 |
| 4 | PA0WWM | JO22 CM | 115 | 1298 |
| 5 | F6DKW | JN18 BI | 115 | 1215 |
| 6 | HB9AMH/P | JN37 DH | 111 | 1351 |
| 7 | DB6NT/A | JO50 FK | 107 | 1243 |
| 8 | G3LQR | JO02 AM | 106 | 1274 |
| 9 | PE0AGO | JO32 DM | 102 | 1200 |
| 10 | G3XDY | JO02 AM | 99 | 1139 |
| 11 | F1EAN | JN06 AG | 90 | 1321 |
| 12 | SP6GWB | JO80 IK | 89 | 1580 |
| 13 | OK1KIR/P | JO60 GK | 89 | 1208 |
| 14 | G6DER | IO93 ZN | 86 | 1306 |
| 15 | DL7QY | JN59 FJ | 86 | 1261 |
| 16 | DB6BX | JO32 DM | 86 | 1117 |
| 17 | F5PAU | IN88 YI | 85 | 1630 |
| 18 | SP6MLK | JO80 IK | 85 | 1580 |
| 19 | OE5VRL/5 | JN78 HI | 83 | 1522 |
| 20 | SM6ESG | JO67 GR | 82 | 1440 |
| 21 | OZ2OE | JO45 EP | 82 | 1425 |
| 22 | DL3YEE | JO42 EM | 80 | 1136 |
| 23 | DK1KR | JO53 FN | 79 | 1097 |
| 24 | DK6AS | JO52 FM | 78 | 1421 |
| 25 | SM7ECM | JO65 GP | 78 | 1322 |
| 26 | PA0BAT | JO31 DL | 78 | 1014 |
| 27 | PA3DIJ | JO33 DN | 78 | 939 |
| 28 | DL1BKK | JO43 EN | 75 | 995 |
| 29 | G6LEU | IO70 XK | 74 | 2620 |
| 30 | OZ1IPU | JO57 FR | 70 | 1096 |
| 31 | DL4VCG | JN39 DJ | 70 | 838 |
| 32 | OK1AIY/P | JO70 HK | 69 | 1490 |
| 33 | G4PMK | IO93 ZN | 66 | 1302 |
| 34 | HB9RG | JN47 EH | 66 | 920 |
| 35 | DF1EQ | JO31 DL | 65 | 908 |
| 36 | DC4XH | JO43 EN | 63 | 1090 |
| 37 | G4LRT | IO92 ZM | 62 | 1152 |
| 38 | DG9NBT | JN49 EJ | 62 | 1016 |
| 39 | DH3NAN | JO50 FK | 61 | 1143 |
| 40 | DG5NEX | JN49 EJ | 61 | 1060 |
| 41 | HB9AOF | JN36 DG | 61 | 920 |
| 42 | HB9MIO/P | JN37 DH | 60 | 1000 |
| 43 | G6HKM | JO01 AL | 58 | 1193 |
| 44 | DL0UL/P | JN48 EI | 58 | 962 |
| 45 | DF9QX | JO42 EM | 57 | 1066 |
| 46 | F5HRY | JN18 BI | 57 | 1064 |
| 47 | SM0FZH | JO99 JT | 56 | 1252 |
| 48 | DK0OG | JN68 GI | 56 | 1160 |
| 49 | DJ6XV | JO31 DL | 56 | 946 |
| 50 | DG0CR/P | JO50 FK | 55 | 1048 |
| 51 | DC0DA | JO31 DL | 55 | 1034 |
| 52 | DL1SUN | JO53 FN | 54 | 1162 |
| 53 | DL9GU | JN49 EJ | 54 | 900 |
| 54 | DC8UG | JO30 DK | 54 | 900 |
| 55 | RA3LE | KO64QO | 52 | 1428 |
| 56 | SP9FG | JN99 JJ | 51 | 1492 |
| 57 | DL3NQ | JN49 EJ | 51 | 920 |
| 58 | ON4ANT | JO20 CK | 51 | 914 |
| 59 | LA8AK | JO38 DS | 49 | 1373 |
| 60 | DB8NU | JN49 EJ | 49 | 1016 |
| 61 | GW4LXO | IO81 YL | 48 | 990 |
| 62 | OK1DKS/P | JO60 GK | 46 | 1207 |
| 63 | ON4GG | JO20 CK | 44 | 934 |
| 64 | DJ6MB | JO30 DK | 42 | 876 |
| 65 | DB1BX | JO32 DM | 41 | 895 |
| 66 | DC6DY | JO31 DL | 39 | 865 |
| 67 | F6CGB | JN18 BI | 38 | 700 |
| 68 | F1GTU | JN05 AF | 36 | 896 |
| 69 | DK2DB | JN48 EI | 36 | 873 |
| 70 | OE3JPC | JN88 II | 36 | 702 |

## DUBUS 2320 MHz Top List

| NR | CALL | WW | EUWK | ODX |
|---|---|---|---|---|
| 1 | PA0EZ | JO22 CM | 72 | 962 |
| 2 | PA0RDY | JO22 CM | 59 | 831 |
| 3 | DB6NT/A | JO50 FK | 55 | 1119 |
| 4 | PA0WWM | JO22 CM | 54 | 851 |
| 5 | G3LQR | JO02 AM | 52 | 1006 |
| 6 | PE0AGO | JO32 DM | 49 | 800 |
| 7 | OK1KIR/P | JO60 GK | 48 | 1115 |
| 8 | DL7QY | JN59 FJ | 47 | 1018 |
| 9 | G6DER | IO93 ZN | 44 | 1265 |
| 10 | DL1BKK | JO43 EN | 43 | 760 |
| 11 | PA3DIJ | JO33 DN | 42 | 727 |
| 12 | OK1AIY/P | JO70 HK | 40 | 1296 |
| 13 | SM6ESG | JO67 GR | 37 | 1051 |
| 14 | F5FHI | IN97 ZH | 37 | 1017 |
| 15 | PA0BAT | JO31 DL | 37 | 923 |
| 16 | DC8UG | JO30 DK | 33 | 900 |
| 17 | DF1EQ | JO31 DL | 33 | 678 |
| 18 | OE5VRL/5 | JN78 HI | 32 | 1289 |
| 19 | DC0DA | JO31 DL | 31 | 775 |
| 20 | SM7ECM | JO65 GP | 30 | 877 |
| 21 | OZ1IPU | JO57 FR | 29 | 1028 |
| 22 | DL3NQ | JN49 EJ | 29 | 890 |
| 23 | DL9GU | JN49 EJ | 29 | 877 |
| 24 | G4LRT | IO92 ZM | 27 | 1022 |
| 25 | G3XDY | JO02 AM | 27 | 947 |
| 26 | DL3YEE | JO42 EM | 27 | 912 |
| 27 | DG0CR/P | JO50 FK | 26 | 962 |
| 28 | DF9QX | JO42 EM | 26 | 915 |
| 29 | OZ2OE | JO45 EP | 26 | 809 |
| 30 | HB9MIO/P | JN37 DH | 26 | 694 |
| 31 | DL4VCG | JN39 DJ | 25 | 668 |
| 32 | I0LVA | JN62 GC | 23 | 612 |
| 33 | G4PMK | IO93 ZN | 22 | 1249 |
| 34 | DL0UL/P | JN48 EI | 21 | 493 |
| 35 | DK2DB | JN48 EI | 20 | 873 |
| 36 | F1EAN | JN06 AG | 19 | 940 |
| 37 | HB9AMH/P | JN37 DH | 18 | 933 |
| 38 | DB1BX | JO32 DM | 18 | 525 |
| 39 | DK0PX | JN48 EI | 17 | 566 |
| 40 | DK0OG | JN68 GI | 17 | 512 |
| 41 | DG9NBT | JN49 EJ | 17 | 465 |
| 42 | DB8NU | JN49 EJ | 17 | 428 |
| 43 | DG5NEX | JN49 EJ | 16 | 465 |
| 44 | DF6VB | JO31 DL | 15 | 414 |
| 45 | OK1DKS/P | JO60 GK | 13 | 504 |
| 46 | F5HRY | JN18 BI | 12 | 539 |
| 47 | DL3IAS | JN49 EJ | 12 | 445 |
| 48 | DJ6XV | JO31 DL | 12 | 396 |
| 49 | DK6AS | JO52 FM | 11 | 620 |
| 50 | I2FUM/2 | JN44 EE | 10 | 354 |

## DUBUS 3400 MHz Top List

| NR | CALL | WW | EUWK | ODX |
|---|---|---|---|---|
| 1 | DB6NT/A | JO50 FK | 27 | 738 |
| 2 | PA0EZ | JO22 CM | 23 | 636 |
| 3 | DC0DA | JO31 DL | 17 | 660 |
| 4 | PE0AGO | JO32 DM | 17 | 457 |
| 5 | G3LQR | JO02 AM | 16 | 924 |
| 6 | PA0BAT | JO31 DL | 16 | 568 |
| 7 | PA0WWM | JO22 CM | 16 | 435 |
| 8 | DL1BKK | JO43 EN | 15 | 703 |
| 9 | DL3NQ | JN49 EJ | 15 | 637 |
| 10 | DL7QY | JN59 FJ | 15 | 565 |
| 11 | DC8UG | JO30 DK | 13 | 724 |
| 12 | G6DER | IO93 ZN | 13 | 718 |
| 13 | DF1EQ | JO31 DL | 13 | 532 |
| 14 | PA0RDY | JO22 CM | 12 | 445 |
| 15 | G4PMK | IO93 ZN | 10 | 845 |
| 16 | DB1BX | JO32 DM | 9 | 425 |
| 17 | DK2DB | JN48 EI | 9 | 331 |
| 18 | DL0UL/P | JN48 EI | 9 | 239 |
| 19 | DK0PX | JN48 EI | 6 | 528 |
| 20 | DL4VCG | JN39 DJ | 6 | 339 |
| 21 | G4LRT | IO92 ZM | 5 | 421 |
| 22 | DJ8ES | JO43 EN | 4 | 578 |

## DUBUS 5760 MHz Top List

| NR | CALL | WW | EUWK | ODX |
|---|---|---|---|---|
| 1 | HB9AMH/P | JN37 DH | 29 | 700 |
| 2 | DB6NT/A | JO50 FK | 26 | 880 |
| 3 | PA0EZ | JO22 CM | 26 | 835 |
| 4 | HB9MIO/P | JN37 DH | 26 | 694 |
| 5 | SM7ECM | JO65 GP | 24 | 857 |
| 6 | G3LQR | JO02 AM | 20 | 949 |
| 7 | DL1BKK | JO43 EN | 18 | 689 |
| 8 | SM6ESG | JO67 GR | 16 | 947 |
| 9 | PA0BAT | JO31 DL | 16 | 723 |
| 10 | OZ1IPU | JO57 FR | 15 | 805 |
| 11 | PE0AGO | JO32 DM | 15 | 800 |
| 12 | OK1KIR/P | JO60 GK | 14 | 362 |
| 13 | I0LVA | JN62 GC | 12 | 557 |
| 14 | DL3NQ | JN49 EJ | 12 | 318 |
| 15 | DC0DA | JO31 DL | 11 | 451 |
| 16 | DL0UL/P | JN48 EI | 11 | 266 |
| 17 | DC8UG | JO30 DK | 10 | 724 |
| 18 | DL7QY | JN59 FJ | 10 | 565 |
| 19 | G6DER | IO93 ZN | 9 | 947 |
| 20 | PA0WWM | JO22 CM | 9 | 772 |
| 21 | OK1AIY/P | JO70 HK | 9 | 693 |
| 22 | HB9MIN/P | JN37 DH | 8 | 286 |

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## DUBUS 10 GHz Top List

| NR | CALL | WW | | EU | WKODX |
|---|---|---|---|---|---|
| 1 | PA0EZ | JO22 | CM | 50 | 835 |
| 2 | HB9AMH/P | JN37 | DH | 43 | 939 |
| 3 | HB9MIN/P | JN37 | DH | 41 | 939 |
| 4 | SM7ECM | JO65 | GP | 39 | 1110 |
| 5 | I6XCK/6 | JN63 | GD | 39 | 702 |
| 6 | I6CXB/6 | JN63 | GD | 35 | 751 |
| 7 | DL3YEE | JO42 | EM | 35 | 700 |
| 8 | G3WDG | IO92 | ZM | 31 | 1008 |
| 9 | DB6NT/A | JO50 | FK | 31 | 692 |
| 10 | G4BRK | IO91 | ZL | 30 | 1115 |
| 11 | G3LQR | JO02 | AM | 30 | 924 |
| 12 | PA0BAT | JO31 | DL | 30 | 604 |
| 13 | HB9RG | JN47 | EH | 28 | 761 |
| 14 | HB9MIO/P | JN37 | DH | 28 | 694 |
| 15 | DK1KR | JO53 | FN | 27 | 808 |
| 16 | I0LVA | JN62 | GC | 26 | 850 |
| 17 | DL3NQ | JN49 | EJ | 26 | 712 |
| 18 | SM6ESG | JO67 | GR | 25 | 1043 |
| 19 | DL1BKK | JO43 | EN | 24 | 662 |
| 20 | G4KGC | IO92 | ZM | 23 | 769 |
| 21 | F6DKW | JN18 | BI | 23 | 695 |
| 22 | OE5VRL/5 | JN78 | HI | 22 | 549 |
| 23 | OK1KIR/P | JO60 | GK | 21 | 419 |
| 24 | OZ2OE | JO45 | EP | 20 | 789 |
| 25 | PA0WWM | JO22 | CM | 20 | 589 |
| 26 | DF9QX | JO42 | EM | 19 | 504 |
| 27 | G4LDR | IO91 | ZL | 18 | 1118 |
| 28 | OZ1IPU | JO57 | FR | 18 | 941 |
| 29 | PE0AGO | JO32 | DM | 18 | 800 |
| 30 | DK0OG | JN68 | GI | 18 | 512 |
| 31 | DK0PX | JN48 | EI | 17 | 419 |
| 32 | DK4GD/P | JN48 | EI | 17 | 411 |
| 33 | DL0UL/P | JN57 | EI | 17 | 363 |
| 34 | DC8UG | JO30 | DK | 15 | 753 |
| 35 | S51WI | JN75 | HF | 15 | 532 |
| 36 | DL7QY | JN59 | FJ | 15 | 492 |
| 37 | G4PMK | IO93 | ZN | 14 | 958 |
| 38 | DC0DA | JO31 | DL | 14 | 639 |
| 39 | DK2DB | JN48 | EI | 14 | 432 |
| 40 | OK1AIY/P | JO70 | HK | 12 | 736 |
| 41 | DG9NBT | JN49 | EJ | 12 | 426 |
| 42 | DL4VCG | JN39 | DJ | 12 | 360 |
| 43 | GW4LXO | IO81 | YL | 12 | 309 |
| 44 | G4KNZ | IO91 | ZL | 12 | 247 |
| 45 | DB1BX | JO32 | DM | 11 | 465 |
| 46 | I4XCC | JN63 | GD | 11 | 426 |
| 47 | F5HRY | JN18 | BI | 10 | 684 |
| 48 | HB9AMH | JN37 | DH | 9 | 567 |
| 49 | SM0FZH | JO99 | JT | 9 | 242 |

## DUBUS 24 GHz Top List

| NR | CALL | WW | | EU | WKODX |
|---|---|---|---|---|---|
| 1 | HB9MIN/P | JN37 | DH | 12 | 396 |
| 2 | HB9AMH/P | JN37 | DH | 10 | 286 |
| 3 | HB9MIO/P | JN37 | DH | 10 | 172 |
| 4 | DB6NT/A | JO50 | FK | 5 | 178 |
| 5 | DF2CA/P | JN58 | FI | 5 | 142 |
| 6 | DK4GD/P | JN48 | EI | 4 | 184 |
| 7 | DL3YEE/P | JO42 | EM | 4 | 151 |
| 8 | DF6VB/P | JO31 | DL | 4 | 104 |
| 9 | OK1AIY/P | JO60 | GK | 3 | |
| 10 | G4KNZ/P | IO83 | YN | 3 | 120 |
| 11 | DL3NQ | JN49 | EJ | 3 | 112 |
| 12 | DK0PX | JN48 | EI | 3 | 99 |
| 13 | DF1EQ/P | JO31 | DL | 2 | 133 |
| 14 | DL1JIN/P | JO60 | GK | 2 | 58 |
| 15 | DG0CR/P | JO50 | FK | 2 | 52 |
| 16 | DK2DB | JN48 | EI | 2 | 48 |
| 17 | DC0DA/P | JO32 | DM | 1 | 104 |
| 18 | F6CGB/P | JN37 | DH | 1 | 74 |
| 19 | GW4LXO | IO81 | YL | 1 | 58 |
| 20 | OZ1IPU | JO57 | FR | 1 | 55 |

## DUBUS 47 GHz Top List

| NR | CALL | WW | | EU | WKODX |
|---|---|---|---|---|---|
| 1 | HB9MIN/P | JN37 | DH | 8 | 185 |
| 2 | HB9MIO/P | JN37 | DH | 8 | 166 |
| 3 | HB9AMH/P | JN37 | DH | 5 | 166 |
| 4 | DF2CA/P_ | JN58 | FI | 4 | 15 |
| 5 | OE9PMJ/9 | JN47 | EH | 4 | 12 |
| 6 | OE9YTV/9 | JN47 | EH | 4 | 11 |
| 7 | DK4GD/P | JN47 | EH | 3 | 123 |
| 8 | DB6NT/A | JO50 | FK | 2 | 95 |
| 9 | DF6VB/P | JO31 | DL | 2 | 69 |
| 10 | DC0DA/P | JO31 | DL | 2 | 69 |
| 11 | DF2CA/P | JO60 | GK | 2 | 59 |
| 12 | DL3YEE/P | JO42 | EM | 2 | 45 |
| 13 | DL/HB9AMH/P | JN48 | EI | 1 | 184 |
| 14 | DL1JIN/P | JO60 | GK | 1 | 58 |

## DUBUS 76GHz Top List

| NR | CALL | WW | | EU | WKODX |
|---|---|---|---|---|---|
| 1 | DG2MF/P | JO58 | FI | 4 | 4 |
| 2 | DF2CA/P | JO50 | FK | 4 | 4 |
| 3 | OE9YTV/9 | JN57 | FH | 3 | 1 |
| 4 | OE9PMJ/9 | JN57 | FH | 3 | 1 |
| 5 | DB6NT/A | JO50 | FK | 2 | 77 |
| 6 | DC0DA/P | JO50 | FK | 2 | 48 |
| 7 | DF6VB/P | JO50 | FK | 1 | 18 |
| 8 | DL1JIN/P | JO60 | GK | 1 | 11 |
| 9 | OE9FKI | JN47 | EH | 1 | 2 |
| 10 | HB9AMH/P | JN37 | DH | 1 | 1 |
| 11 | HB9MIN/P | JN37 | DH | 1 | 1 |

## DUBUS 145GHz Top List

| NR | CALL | WW | | EU | WKODX |
|---|---|---|---|---|---|
| 1 | DB6NT/OZ | JO57 | FR | 1 | 3 |
| 2 | DB6NT/A | JO50 | FK | 1 | 1 |
| 3 | DL1JIN/P | JO60 | GK | 1 | 1 |

## DUBUS 241 GHz Top List

| NR | CALL | WW | | EU | WKODX |
|---|---|---|---|---|---|
| 1 | DB6NT/OZ | JO57 | FR | 1 | 1 |
| 2 | DB6NT/A | JO50 | FK | 1 | 1 |