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INFO: 2/83

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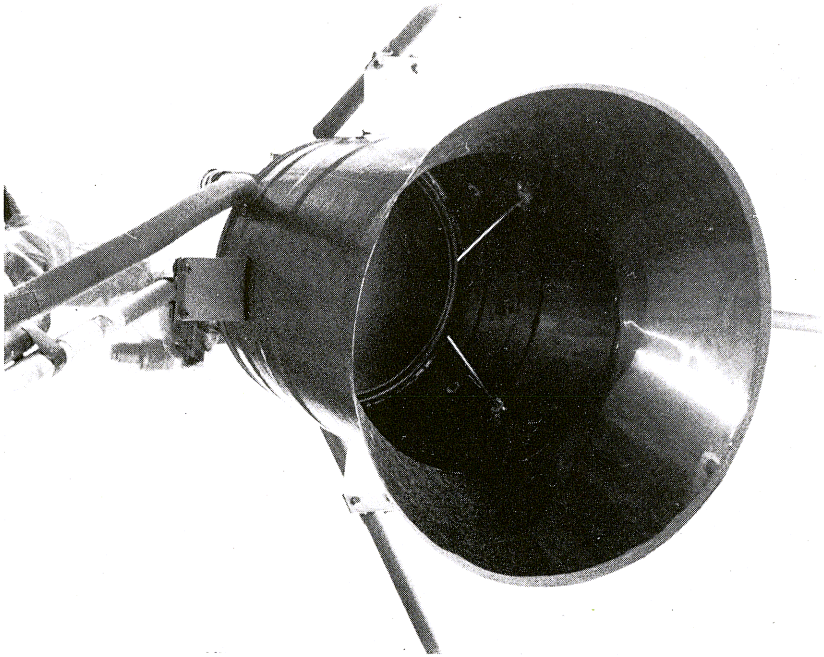

Horn Feeder

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COVERPICTURE: DL7YC's 23 cm Parabole Feeder (s. page 111)

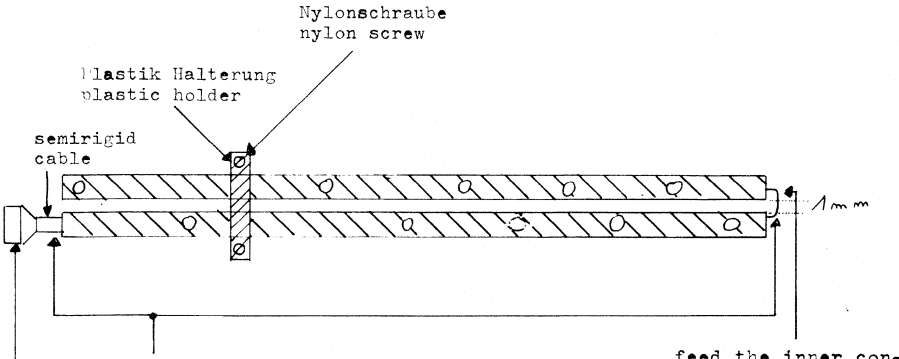
CONTENTS:

LOG. PERIODIC ANTENNA 1.0-3.5 GHz

by Hans Schinnerling, DC 8 CE

E. : This log.-per.-antenna covers the 24cm, 13cm and 9cm Amateur-Radio-Bands.
The schematics shows all dimensions of this antenna. The boom is made of brass tube with 6mm diameter and the elements are made of 3mm copper wire. The gain is closed by 6 dB (over dipole) over the frequency. In a dish with a f/D ratio of 0.5, you get an antenna for three bands. This antenna is also good for beacons, testing and local qso's.

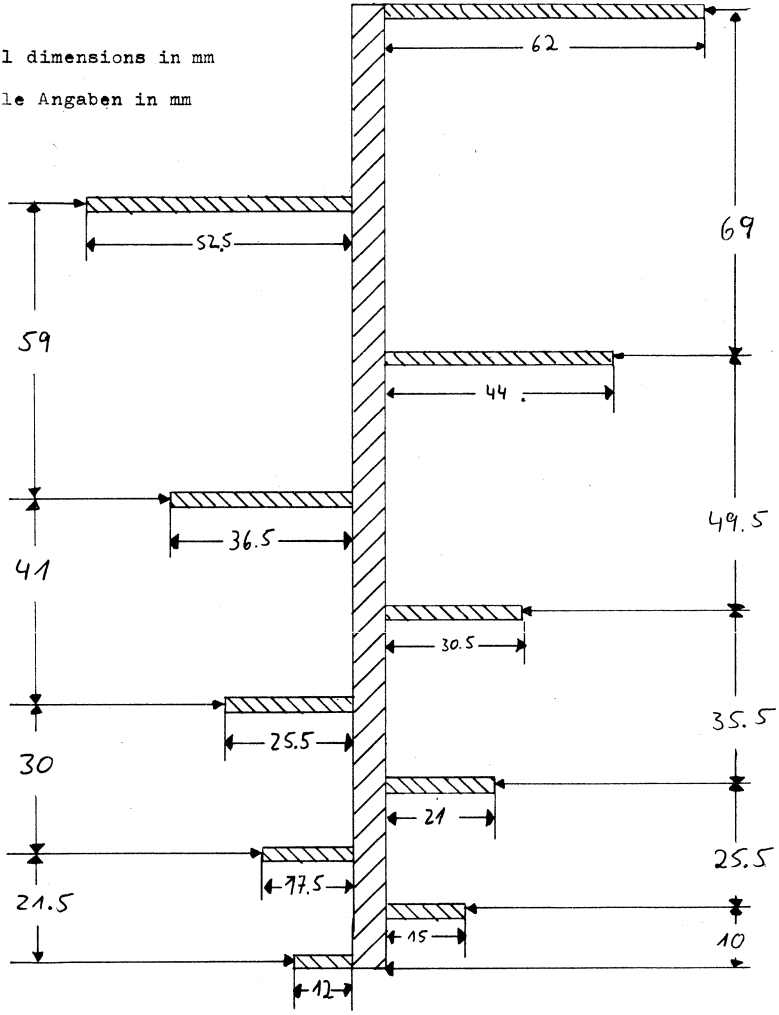
D. : Diese log. per. Antenne ist für die Bänder 24cm - 9cm geeignet. Die Zeichnungen zeigen alle nötigen Abmessungen der Antenne. Der Boom besteht aus einem 6mm Durchmesser Messingrohr und die Elemente aus 3mm Kupferdraht. Der Gewinn liegt bei max. 6 dB über Dipol im gesamten Bereich. In einem Parabolspiegel mit einem f/D Verhältnis von 0,5 hat man einen Strahler für 3 Bänder. Diese Antenne kann auch für Baken, zum Testen oder für Orts-qso's benutzt werden.



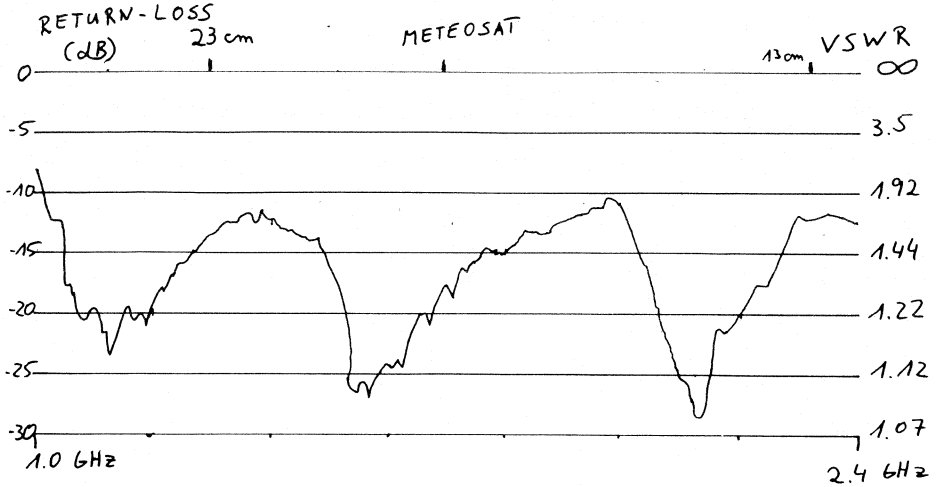
log, per. ant. DC8CE

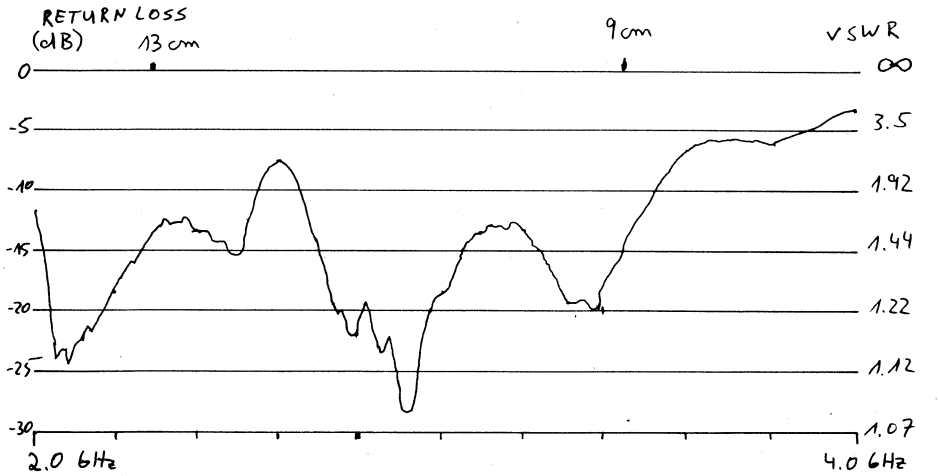
all dimensions in mm

alle Angaben in mm



log. per. antenna DC8CE





LOG. PER. ANT DC8CE

USE FOR CW CQ CALL 144.050 MHZ

REFLECTOMETER WITH COAXIAL COUPLER

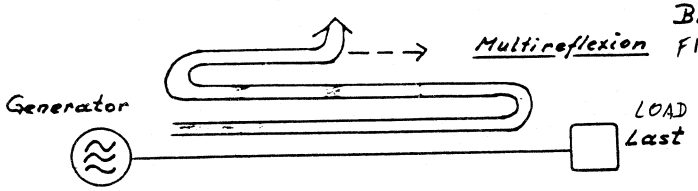
continued from 1/83

It is also to take into consideration the matching of the generator. But it is only interesting at high reflection rates of the test object and does multi reflections, which does a fault measure. Power control loops at the generator or a non reflection attenuator will be make the output SWR of the generator better.

Fortsetzung aus 1/83

Die Anpassung des Generators ist zu berücksichtigen. Sie hat nur bei großen Reflektionsverhältnissen des Meßobjektes Bedeutung und verursacht Multireflektion, die Meßfehler verursachen. Pegelregelschleifen am Generator oder einfügen von reflektionsarmen Dämpfungsgliedern verbessern grundsätzlich das Ausgangsstehwellenverhältnis einer Quelle.

Bild:17
Fig:17



It can be profitable to modulate the generator, usual is 1 KHz modulation frequenz. You get back the af with the coupling detector diode and indicated with a wide band or better a selective voltagemeter. This methode is usual if there is only a small rf power or the test objekt can only tested with small rf power. With unmodulated rf power the diodes give only a very small direct voltage, which is indicated with high gain and can be drift.

The detector has to demodulate the rf wave on the parallel line and gives a direct voltage or af. The diode can be placed into the coupler or connected as a diode measuring head to the coupler with N or BNC connectors. The measuring head has to be an impedance termination for the parallel line, to have here no reflection. Amateurs use the diodes mostly up into linear part of the family of characteristics, because they have enough power from the generator

Weiter kann es nützlich sein den Generator zu modulieren, 1 KHz Modulationsfrequenz sind üblich. Die NF wird mittels der Koppler-Detektordiode zurückgewonnen und mit einem Breitband oder besser mit einem selektiven Voltmeter angezeigt. Die Methode ist üblich falls nur kleine HF-Leistung zur Verfügung steht bzw. das Testobjekt nur mit kleiner Leistung angesteuert werden darf. Bei unmodulierter HF würde die Diode nur eine entsprechende sehr geringe Gleichspannung abgeben, die hochverstärkt zur Anzeige gelangt und in der Regel driftbehaftet ist.

Der Detektor hat die Aufgabe, die am Nebenarm des Kopplers auftretende HF-Welle zu demodulieren und gibt eine Gleichspannung oder NF-Spannung ab. Die Diode kann mit in den Aufbau des Kopplers einbezogen sein, oder als Diodenmeßkopf an den Koppler mittels N- oder BNC-Stecker verbunden werden. Der Meßkopf soll als impedanzmäßiger Abschluß für den Koppelarm wirken, um möglichst geringe Reflektion zu erzeugen. Im Amateurfunkbetrieb werden die Dioden vorwiegend bis in den linearen Kennlinienbereich gefahren, da generatorseitig (TX) problemlos hohe

(TX). At the commercial science of measurement they work at the quadratic part of the family of the characteristics, the generator power is small. The profit is the indication scaling. With a log amplifier you get a linear scaled log display, and if you have small or high RTL values, both are good readable. Simple reflectometer systems use the hole family of characteristics of the diode, so that the lower part of the indication is not linear. As the detector diode it is better to use only Schottky diodes, because they have a high brek-down voltage and are sensitive. The sensitiveness can be improved by a bias current of abt. 20 uA. The diode load resistor is 3... ..10 KΩ .

The voltage from the demodulator has to be indicated. Analog pointer instruments are used for one frequency measurering, digital indication is very sophisticated and only for commercial measurement profitable. For the sweep measureing method is used an oscilloscope, to display without sluggishness on the y-axis the reflection values and on the x-axis the frequency.

Leistung verfügbar ist. In der kommerziellen Meßtechnik arbeitet man nur im quadratischen Kennlinien Bereich; die Meßleistung ist entsprechend gering. Der Vorteil ist in der Anzeigeeinteilung zu sehen. Mit einem Log-Verstärker wird eine linear eingeteilte Log-Darstellung erreicht und große, wie kleine RTL-Werte sind gleichgut abzulesen. Einfache Reflektometersysteme überstreichen den gesamten Kennlinienbereich der Diode, wodurch der untere Bereich der Anzeige gestaucht dargestellt wird. Als Diode sollte man nur Schottky-Dioden verwenden, sie sind durch die hohe Durchbruchspannung und Empfindlichkeit besonders gut geeignet. Die Empfindlichkeit kann durch einen Vorstrom von etwa 20 uA gesteigert werden, als Diodenlastwiderstand sind 3.....10 K üblich.

Die vom Demodulator aus der HF-Welle gewonnene Gleichspannung muß zur Anzeige gebracht werden. Analoge Zeigerinstrumente benutzt man bei Einzelfrequenzmessung; digitale Anzeige ist sehr aufwendig und auch nur in der kommerziellen Meßtechnik vorteilhaft. Für die gewobbelte Meßfrequenzmethode wird ein Oszilloskop benutzt, um trägheitslos auf der y-Achse die Reflektionswerte abzubilden und auf der x-Achse die Frequenz darzustellen.

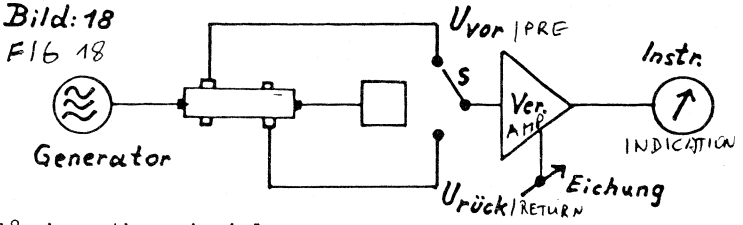


Fig. 18 shows the principle mounting style of a reflectometer system of measurement which is switchable between Upre and Uref, with indication-amplifier which can calibrated, gain control and an uA-meter as an indication. The amplifier is not used, when the uA-meter is very sensitive and matched with pre-resistors to the voltage range.

Bild 18 zeigt den grundsätzlichen Aufbau eines Reflektometersystems mit Umschaltung zwischen Uvor und Urück, Anzeigeverstärker mit Eichmöglichkeit, Verstärkungsregelung und uA-Meter als Anzeigeinstrument. Der Verstärker erübrigt sich, wenn das Instrument ausreichent empfindlich ist und mit Vorwiderständen an den Spannungsbereich angepaßt werden kann.

Bild:19

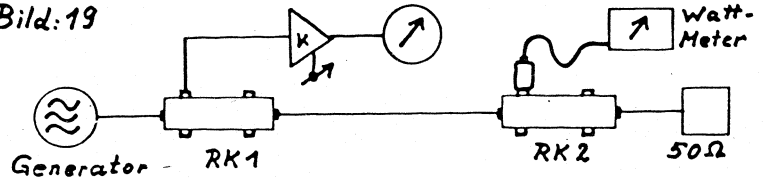


Bild:20

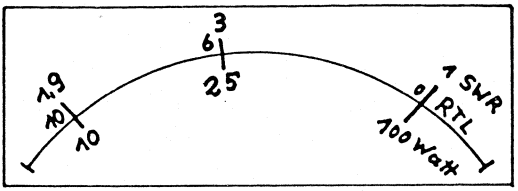
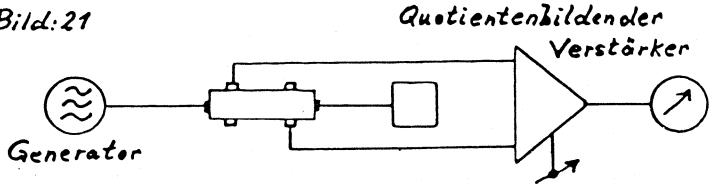


Fig. 19 shows the first calibration of the instrument and it has to be done with well known power.
Before measure, the system has to be calibrated. The switch is locked to Upre. The instrument is set with the generator line or the calibration control to SWR = 1 or RTL = 0 dB. At switch position Uref the matching is displayed as SWR. But at every generator power changing it is necessary to calibrate again. At Fig. 4 is shown a better method of measurement. If the ratio between Upre and Uref. is measured with an IC, than the power differents can reduced. See also VHF-Communication 2/80.

Bild 19, die Grundeichung des Instrumentes muß mit bekannter Leistung durchgeführt werden.
Vor einer Reflexionsmessung muß das Reflektometersystem geeicht werden. Schalterstellung in Richtung Uvor. Das Instrument wird nun mit der Generatorleistung oder mit dem Eichregler auf SWR = 1 oder RTL = 0 dB eingestellt. In Schalterstellung Urück kann jetzt direkt der Wert der Anpassung als SWR abgelesen werden. Jede Generatorpegeländerung erfordert jedoch eine neue Eichung. In Bild 4 ist eine wesentlich bessere Anzeigeeinheit dargestellt. Durch unmittelbare Verhältnisbildung der Uvor zu Urück mit einem Quotientenbildendem IC werden automatisch Pegelschwankungen nahezu reduziert. Ein praktischer Bauvorschlag von DK 1 OF ist in UKW-Bericht 2/80 zu finden.

Bild:21



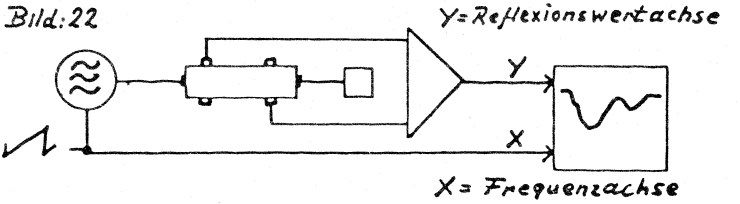
The best way to prepare a reflectometersystem is to use a sweeper as the generator and an oscilloscope as the indication. Here are displayed the reflection values above a great frequency range, changes at the test object

Eine erhebliche Verbesserung des Reflektometersystems ist mit einem Wobbler oder Sweeper als Generator und Oszilloskop als Anzeigeeinheit zu erreichen. Hier werden die Reflektionswerte über einen weiten Frequenzbereich unmittelbar dargestellt,

can displayed better.

Veränderungen am Testobjekt sind sofort offensichtlich.

Bild:22



For the directional coupler the most important value is the directivity, which is clecisive for the error in measurement, at good matching . The directivity value in dB is the ratio between the outcoupled power of the two parallel lines. Directivity (dB) = 10 log Ppre/ Pref Fig. 23 shows this relation.

Für den Meßrichtkoppler ist die wichtigste Kenngröße die Richtschärfe, sie bestimmt bei großen RTL Werten, also bei guter Anpassung, ganz erheblich die Meßgenauigkeit. Der Richtschärfewert in dB gibt das Verhältnis von ausgekoppelter Energie bei Vorwärtsbetrieb zu ausgekoppelter Energie bei Rückwärtsbetrieb an. Bild 23 zeigt diesen Zusammenhang mit Werten.

Bild:23

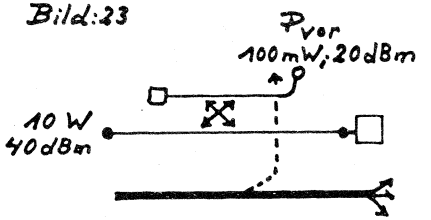
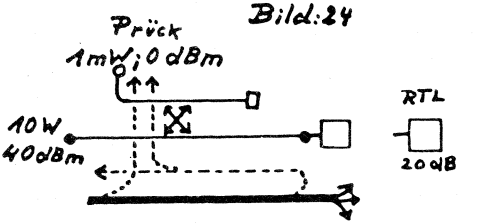


Bild:24



$$\text{Richtschärfe (dB)} = 10 \log \frac{P_{vor}}{P_{rück}}$$

Besause of the coupling attenuation of 20 dB, the pre running power is attenuated to 20 dBm at the parallel line. It is used a terminating impedance with RTL bigger than 52 dB at 2 GHz, so that the reflected power is nearly zero and not noted. The coupler used in backwarts direction connected with the same terminating impedance has to display now no power, but it still shows a value of 1 mW or 0 dBm. At fig. 25 are shown the errors, internal coupling

Aufgrund des Koppelfaktors von 20 dB wird die vorlaufende Energie entsprechend gedämpft, mit 0,1 W oder 20 dBm, am Nebenarm ausgekoppelt. Als Abschlußwiderstand wird ein Präzisionstyp mit RTL = größer 52 dB bei 2GHz benutzt, hiermit ist sichergestellt, daß der Reflexionsbeitrag von dem Abschluß in dem Meßaufbau extrem gering und damit zu vernachlässigen ist. Der Koppler in Rückwärtsrichtung mit gleichen Abschluß betrieben, sollte idealerweise keine Energie am Nebenarm auskoppeln, denoch messen wir einen Wert von 1mW oder 0 dBm. Wie im Bild 25 durch Pfeile dargestellt, verursachen interne Koppler-

reflections of plugs and insolation pieces, impedance jumps in lines, reflection at the parallel line terminating and so on, and untightness from main- to parallel line does a sum signal at the parallel line and does a not wanted error. At fig. 24 the directivity is 20 dB, not a very good value.

The isolation value is the addition of the directivity and coupling. A backwards running signal is attenuated by the coupling and by the directivity, so we get coupling 20 dB + directivity 20 dB = 40 dB isolation.

Up to now, we talked only about scalar quantities (only values no phase), and not about phase relationship. Here we show the vectorial display of different signals, so it is a better understanding of the errors in measurement.
The signal at the parallel line (fig. 24) because of the directivity, is put together of different signals vectorial to the directivity vector.

Bild: 25

Richtschärfevektor

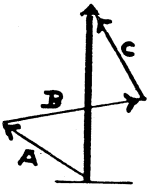


fig. 25
directivity vector

A = Reflexion d. Steckers
B = Impedanzsprung d. Leitung
C = Undichtigkeit

A = reflection of the plug
B = impedance jump of the line
C = untightness

The directivityvector has a value and a phase independent of the generator and load. At fig. 24, we change the termination impedance 52 dB to a termination impedance of 20dB We know that the reflected wave has the same value as the directivity value. At the heterodyne of this two vectors it gives two extremly falls.

reflexionen von Stecker, Isolierstützen, Impedanzsprünge im Leitungszug, Reflexion vom Nebenarmabschluß usw. und eine sogenannte Undichtigkeit von Haupt- zu Nebenarm am Nebenarm ein Summensignal diesen unerwünschten Fehler. Laut Bild 24 beträgt die Richtschärfe = 20 dB, kein guter Wert.

Den Isolationswert erhält man durch Addition der Richtschärfe und Kopplung. Ein in Rückwärtsrichtung wanderndes Signal wird zunächst um den Kopplungsfaktor und zusätzlich mit dem Richtschärfewert gedämpft, damit erhalten wir: Kopplung : 20 dB + Richtschärfe: 20 dB = 40 dB (Isolation).

Da hier ein skalares Meßsystem (nur Beträge, keine Phase) besprochen wird, war bisher nicht die Rede von Phasenbeziehungen. An dieser Stelle soll die vektorielle Beziehung von verschiedenen Signalen das zustandekommen vom Meßfehlern anschaulich darstellen.
Das am Auskoppelarm, Bild 24, aufgrund der Richtschärfe = 20 dB, stehende Signal setzt sich natürlich aus verschiedenen Signalen vektoriell zum Richtschärfevektor zusammen.

Der Richtschärfevektor behält seinen Betrag und seine Phase unabhängig von der äußeren Beschaltung des Kopplers. In Bild 24 tauschen wir den 52 dB RTL Abschluß mit einem Meßobjekt, das ein Rho von 0,1 oder RTL von 20 dB aufweist. Wir merken sofort, daß hier die reflektierte Welle betragsmäßig identisch mit der Richtschärfewelle ist. Bei Überlagerung dieser gleichgroßen Vektoren ergeben sich 2 Extremfälle:

1. directionalvector and reflection wave vector are in phase
2. " and " are 180° out of phase

1. Richtschärfevektor und Reflexionswellenvektor sind in Phase
2. - dto. - und - dto. - sind 180° außer Phase

Bild: 26

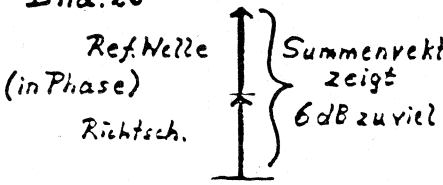


fig.26 refl. wave (in phase) directivity — sumvector shows 6 dB to much

Bild: 27

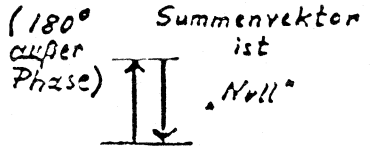
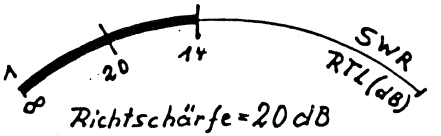


fig.27 (180° out of phase) — sumvector is zero

This facts displayed at our SWR indication shows that there is a big range of misdisplay and big errors are possible.
fig. 28/29

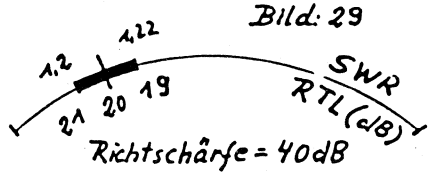
Diese Erkenntnis nun auf eine SWR Anzeige übertragen, läßt erkennen, daß sich ein sehr großer Anzeigespielraum ergibt und erhebliche Meßfehler möglich sind.

Bild: 28



directivity = 20 dB

Bild: 29



directivity = 40 dB

You see, that a directional coupler with a directivity of 40 dB displays the right value better, than the coupler with 20 dB. Fig. 30 shows the measured RTL values above a big frequency range.

Es ist unschwer zu erkennen, daß ein Richtkoppler mit einer Richtschärfe von 40 dB wesentlich genauer den wirklichen Wert anzeigt. Trägt man die gemessen RTL-Werte über einen breiten Frequenzbereich in ein Diagramm, so entsteht Bild 3

Bild: 30

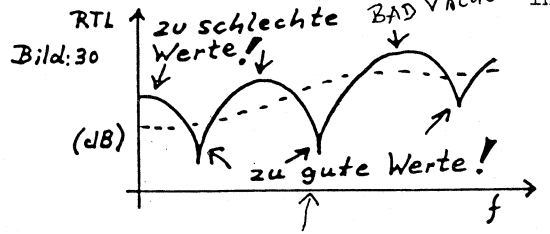


fig. 30 To good values

Gestrichelte Linie
= wirklicher Wert

(Nur mit vektorieller Meßmethode meßbar)

pointed line
= real value

(only measurable vectorial)

The very good RTL values deceive a good matching.
To drop down the errors at a scalar measuring, the directivity has to be more than 15 dB better than the RTL value of the test object. The error is than about 3dB. For example : directivity = 40 dB RTL of the test object = 25 dB, so the indicated value is in the range from 23.5 to 26.5 dB.

Mostly the measuring is done not directly at the test object and at the reflectometer connector, but a coaxial line or an adapter is used. So we have our place where we do our measuring shifted.

Die extrem guten RTL-Spitzenwerte täuschen eine viel zu gute Anpassung vor. Damit das Fehlerfenster bei der skalaren Meßmethode nicht zu groß wird, sollte die Richtschärfe etwa 15 dB größer als der RTL-Wert des Testobjektes sein. Das Ungenauigkeitsfenster hat dann eine größe von etwa 3 dB. Beispiel: Richtschärfe = 40 dB, RTL des Testobjektes = 25 dB, so kann die Anzeige Werte zwischen 23,5 bis 26,5 dB annehmen.
Die Vermessung eines Testobjektes geschied in den meisten Fällen nicht unmittelbar am Reflektometeranschluß sondern häufig ist die Zwischenschaltung eines Kabels oder Adapters notwendig. Hierdurch haben wir unsere Meßebene verlegt.

Bild:31

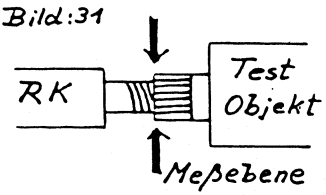


fig. 31 coupler measuring level

Bild:32

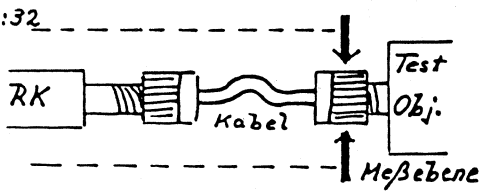
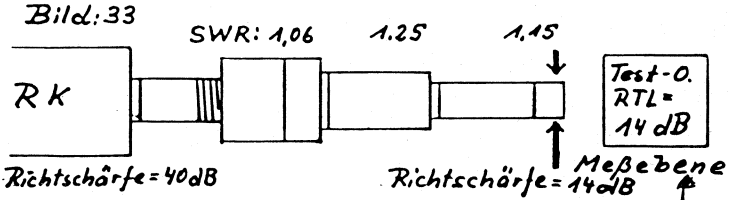


fig. 32 coupler cable measuring level

At fig. 32 we imagine that the coaxial line is in the coupler. Now, the line reflections belong to the internal coupling errors and so it is easy to see, that the directivity value is now not so good. The SWR of a coaxial line runs the directivity direct down.
You can see it at fig. 33

In Bild 32 stellen wir uns einfach vor, daß der Koppler in seinen mech. Abmessungen das Koax Kabel mit beinhaltet. Da die Kabelreflexionen nun zu den internen Koppelfehlerbeiträgen zählt, ist es leicht einzusehen, daß die ursprüngliche Richtschärfe des Kopplers erheblich verschlechtert werden muß. Das SWR eines Kabels oder Adapters erniedrigt direkt die Richtschärfe. Bild 33 verdeutlicht dies.

Bild:33



coupler
directivity = 40 dB

directivity = 14 dB
measuring level

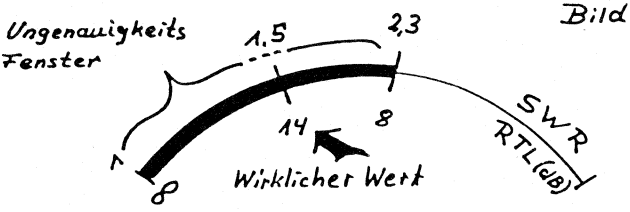
The dirctional coupler has a very good directivity of 40 dB, but when adapter or coaxial line is used the directivity runs down, here from 40 dB to 14 dB , and so the errors in measurement also became very high. The directivity is called the effective directivity.

Obwohl der Richtkoppler eine hervorragende Richtschärfe von 40 dB hat, ist sie durch Einfügen von guten Adaptern nicht mehr wirksam. Die Richtschärfe dieses Systems erniedrigte sich von 40 auf 14 dB, entsprechend groß werden die Meßfehler diese Systems sein. Die neu erhaltene Richtschärfe wird mit "Effektive Richtschärfe" bezeichnet.

fig. 34

inaccuracy window

Bild: 34



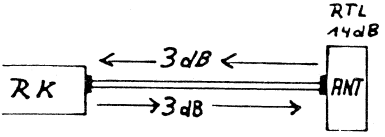
real value

Also an error does the cable loss.

Ein weiterer Fehler verursacht das Einfügen von langen verlustbehafteten Kabeln.

fig. 35

Bild: 35



Die vor- und rücklaufende Welle wird jeweils um 3 dB, also zusammen um 6 dB gedämpft!

coupler the pre-running- and reflected wave are attenuated of 3 dB, together 6 dB !!

The RTL value of the antenna is displayed with 20 dB to good, the real value is 14 dB.

Der RTL-Wert wird mit 20 dB um 6 dB zu gut angezeigt, wirklicher RTL Wert der Ant. = 14 dB.

Pay attention : coaxial line, adapter run down the "effective system directivity" and makes the error in measurement bigger!

Merke: Kabel, Adapter verschlechtern die "Effektive Richtschärfe" und vergrößern das Ungenauigkeitsfenster des Reflektometers!!!

ETM-8C FOR MS

by Erik Cechota, OE 3 CEW

E. : It has disturbed me,also at the ETM-4C, that at input, I had to turn the speed control from the MS-speed down and then turn again back to the MS-speed.
The ETM 8C has two potentiometer at the front panel. The potentiometer P 2 (point-stroke-ratio) has soldered off by me and connected with a little wire at the board. Who wants to have another point-stroke-ratio as 3-1-1 can solder another potentiometer to the board. The potentiometer P 2 (220 K) was replaced by a 100 K lin. potentiometer and below I mounted a micro-switch. With this changings of the circuit (see fig.) , I can control with the left potentiometer the input speed and with the right potentiometer P 2 the MS-speed.
Now, a hint to calibrate the speed: the word PARIS 12 times in a minute is 12 Wpm or 60 lpm or 50 points or 25 periods. So it is now no problem with a MS-recorder and a list to calibrate high MS-speed.

D. : Es hat mich schon bei der ETM-4C gestört, daß man beim Eingeben den Geschwindigkeitsregler von der MS-Gescheindigkeit herunter und wieder zurück drehen mußte.
Die ETM-8C hat zwei Regler auf der Frontplatte. Der Regler P 2 (Punkt-Strich Verhältnis) wurde von mir ausgelötet und auf der Platine mit einem Stück Draht überbrückt. Wer ein anderes P/S-Verhältnis als 3-1-1 wünscht, kann natürlich einen Einstellregler einlöten. Das P2 220 K Pot. wurde durch ein 100 k lin. Pot. ersetzt und darunter ein Microumschalter montiert. Durch Änderung der Schaltung, siehe Bild , kann ich nun am linken Pot, die Eingabegeschwindigkeit und am P 2 die MS-Geschwindigkeit einstellen.
Noch ein Tip zum Eichen der Geschwindigkeit: das Wort PARIS 12 mal gegeben in der Minute bedeutet 12 WpM oder 60 BpM oder 50 Punktlängen oder 25 Perioden (CQ-DL 8/81/384 DJ2YE). Also sicher kein Problem mittels MS-Recorder und Strichliste auch die hohen Geschwindigkeiten zu eichen.

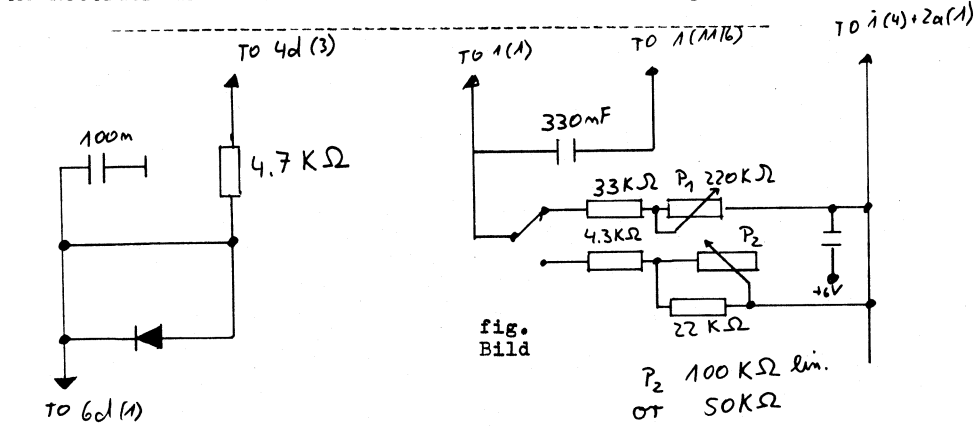


fig.
Bild

nach dem Umbau changed circuit of the ETM-8C

COMPARISION of DIFFERENT FEED HORNs FOR DISH ANTENNAS

by Manfred Plötz, DL 7 YC

E. : Stimulated by some articles in amateur radio magazines, I build in 1981 a circular feed horn for a f/D of 0.66. This horn had to illuminate a 2m dish; to try EME on 1296 MHz. After many tests and own calculations I build a feed horn, from OE9PMJ called "DL7YC-feed". At 1982 I made 8 EME-qso´s with this horn. The solar noice, with NE 720 preamp. direct at the horn, 7.5 dB! The spurios emmission suppression was about 17 dB. I gathered so, that the horn does his job very good. By observing all demanded dates. This dates I measured with a HP-Network Analyser (return-loss and circularity).

Oe9PMJ reproducted this horn and dies some measurement. But unfortunately his length of this horn is incorrect (82 mm to short), by a transmission error. So his results of his measurement are very interesting. At a distance of 20-30m between the horn and a 4el. yagi as an aerial, OE9PMJ measured the beamwith of the horn. By this measuring he got an inverting of the physical fixed beamwith differences. Contrary to the expectation the -3dB and -10 dB H-plane beamwith was bigger as calculated, but right for the f/D of the dish. This explained OEßPMJ by a disturbed physic of the horn. The energized monopole "see" partly the aperture. Now, OE9PMJ lengthen the transition part of the horn to the aperture to a length over all of 394mm. So he got the correct values. (E-plane beamwith smaller than h-plane beamwith). Interesting is, that only the E-plane beamwith changed very strong.
I could show, that with shorten of the length of the transition part of the horn, it is possible to get the same beamwith in H-plane and E-plane, symetrical. The light disturbed physic of the horn is acceptance.
See also fig. 1-4 and tab. . If you can see, the measured values of OE9PMJs feed horn are not the calculated values.of the beamwith.
The good EME results by me are explainable by a light overthrow distortion of the border of the dish. 84° beamwith for -10 dB are ideal, but only -9 to -8 dB maybe are compensating the dish aperture shadow of the horn itself.
Measuring of OK1KIR at all circular polarized EME signals showed only at OE9PMJ a light out of round of -2 dB. My signal was not measured because of a to low signal (only 400 watts at 2m dish). Line 3 at tab. shows that. After measureing, DJ8QL got with the W2IMU-horn (1/2 m length) only 1 dB more sun noice as OE9PMJ with his modified horn. Those statements are subjective, and you have to take into consideration the f/D of the dish. Light over- or underthrow distortion is the reason of this results. In no case a difference of 1 dB is the result of loss at the horn itself. Only the over- or underthrow distortion can do some reduction of the gain.
With this, surely not complete, statement I try to bring some clearness in the secrets of feed horns. Maybe some amateurs try now some own-construction and own tests,

D. : Angeregt durch verschiedene Veröffentlichungen in Amateur-Zeitschriften konstruierte der Verfaser im Jahre 1981 ein Circular Feed Horn für ein f/d von 0,66. Dieses Horn sollte einen nur 2m großen Parabolreflektor ausleuchten und damit evtl. EME Betrieb auf 1296 MHz ermöglichen Nach zahlreichen Versuchen und eigenen Berechnungen entstand das von OE9PMJ so bezeichnete "DL7YC-Feed". Damit konnten 1982 12 EME-Verbindungen

getätigt werden wobei 8 verschiedene Stationen erreicht wurden. Das solare Rauschen betrug mit einem NE 720 GaAs FET Vorverstärker direkt am Horn 7,5 dB! Messungen der Nebenzipfelunterdrückung der gesamten Antenne ergaben eine Unterdrückung von 17 dB. Daraus schloß der Verfasser auf eine gute Funftion des Horns im praktischen Betrieb unter Einhaltung der geforderten Daten. Die objektiv zu bestimmenden Daten des Horns wurden vorher mir einem HP-Network-Analyser bestimmt.(Rückflußdämpfung, Circularität).

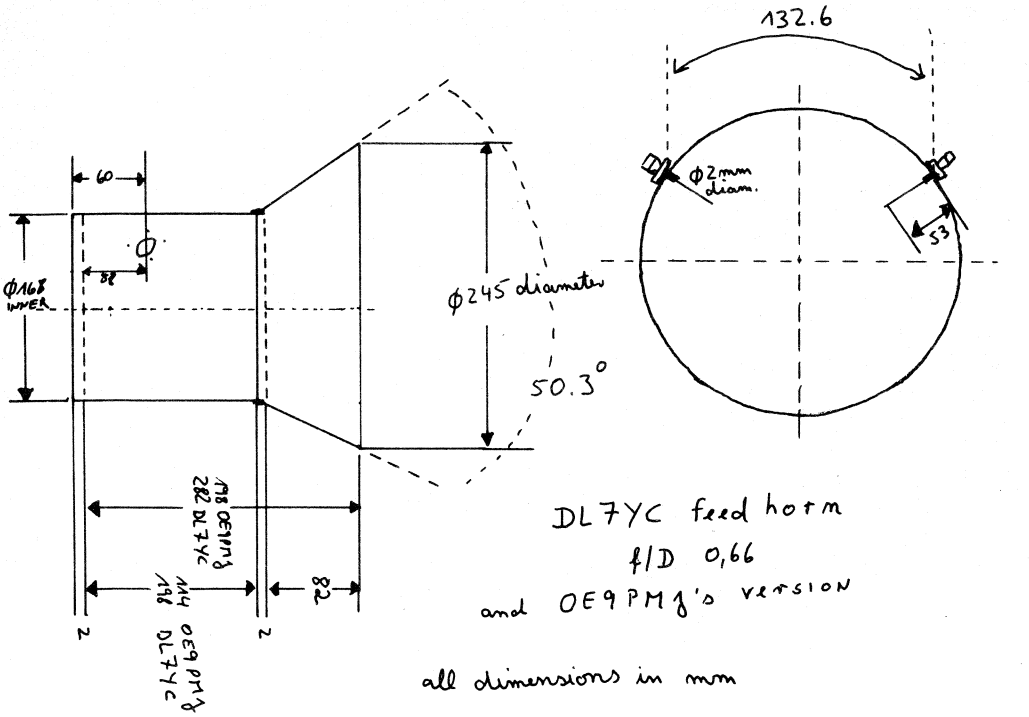
Von diesen Erkenntnissen, übermittelt auf der Weinheimer UKW Tagung 82, baute OE9PMJ das "DL7YC-Horn" nach und vermaß es sehr genau. Leider ist die von ihm verwendete Horn-Länge durch einen Übermittlungsfehler falsch. (82mm im geraden Teil zu kurz). Dadurch werden die Ergebnisse seiner Messungen besonders interessant. Über eine Distanz von 20-30m wurde 8/12/82 am qth von OE9PMJ mit einer 4el. Yagi als Strahler die Öffnungswinkel des Horns in der H- und E-Ebene bestimmt. Dabei stellte sich eine Invertirung der physikalisch bedingten Öffnungswinkel-Unterschiede ein. Ganz im Gegensatz zu den Erwartungen waren die -3 dB und -10 dB Öffnungswinkel in der E-Ebene größer als errechnet. Die H-Ebenen Öffnungswinkel waren kleiner als errechnet, paßten aber gut zum geforderten f/D des Spiegels. Dieses ist nach OE9PMJ auf eine "gestörte Physik" des Strahlers zurückzuführen. Offenbar "sehen" die erregten Monopole teilweise die Apertur. OE9PMJ verlängerte nun das Übergangsstück vom geraden Teil des Horns zur Aperturebene auf eine Gesamtlänge des Strahlers von 394mm. Damit stellten sich nahezu die erwarteten Verhältnisse ein (E-Ebenenöffnungswinkel kleiner als H-Ebenenöffnungswinkel). Interessant daran ist, daß sich nur der Öffnungswinkel in der E-Ebene stark veränderte.

Wie der Verfasser nachweisen konnte, hat man durch gezielte Verkürzung des Hornübergangsstücks die Möglichkeit völlig symmetrische Winkel in beiden Ebenen herzustellen. Die dabei leicht "gestörte Physik" des Hornstrahlers wird bewußt in Kauf genommen. Als Erklährung zu diesem Text sei der Leser auf die Konstruktionszeichnungen und Tabelle 1 verwiesen. Wie man sehen kann, stimmen bei beiden von OE9PMJ gebauten Hörnern die aus dem Aperturdurchmesser errechneten Öffnungswinkel nicht mit den Meßergebnissen überein.

Die guten EME-Ergebnisse bei mir resultieren offenbar aus einer leichten Überstrahlung des Spiegelrandes. Die Randbedeckung (84° Hornöffnungswinkel für -10 dB wäre ideal) von nur -9 bis -8 dB kompensiert wohl die Spiegel+Aperturabschattung durch das Horn selbst.

Messungen von OK1KIR im Dezember 82 an allen 1296 EME-Signalem zeigten nur bei OE9PMJ eine leicht "Unrundheit" von -2 dB. Mein Signal konnte leider wegen mangelnder Feldstärke nicht vermessen werden. (Nur 400 W mit einem 2m Spiegel). Die dritte Zeile in der Tabelle zeigt dieses Phänomen. Nach Messungen bei DJ8QL im Mai 83 erhält man mit dem W2IMU-Horn (1/2 m lang) ca. 1 dB mehr Sonnenrauschen als mit dem von OE9PMJ modifizierten Horn. Der Vollständigkeit halber muß gesagt werden, daß solche Aussagen sehr subjektiv sind und immer in Zusammenhang mit dem verwendeten f/D des Sekundärstrahlers zu sehen sind. Leichte Über- oder Unterstrahlung führen zu diesen Ergebnissen. Keinesfalls resultiert eine Differenz von 1 dB in mehr oder weniger Verlusten in den Hörnern selbst! Allenfalls kann die vorher zitierte Unrundheit des Primärstrahls Gewinnreduzierung bewirken.

Mit diesen, sicherlich nicht vollständigen, Ausführungen sollte versucht werden etwas Klarheit in die "Geheimnisse" der Spiegel- Erreger zu bringen. Vielleicht stößt dieser Artikel auch den einen oder anderen Amateur-Konstrukteur zu weiteren eigenen Versuchen an!!



DL7YC feed horn
f/D 0,66
and OE9PMJ's version

all dimensions in mm

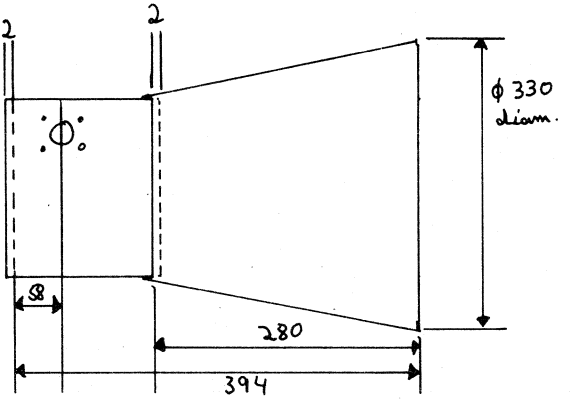


fig. 1

OE9PMJ's feed horn

distance 25122 m

measurement array of OE9PMJ

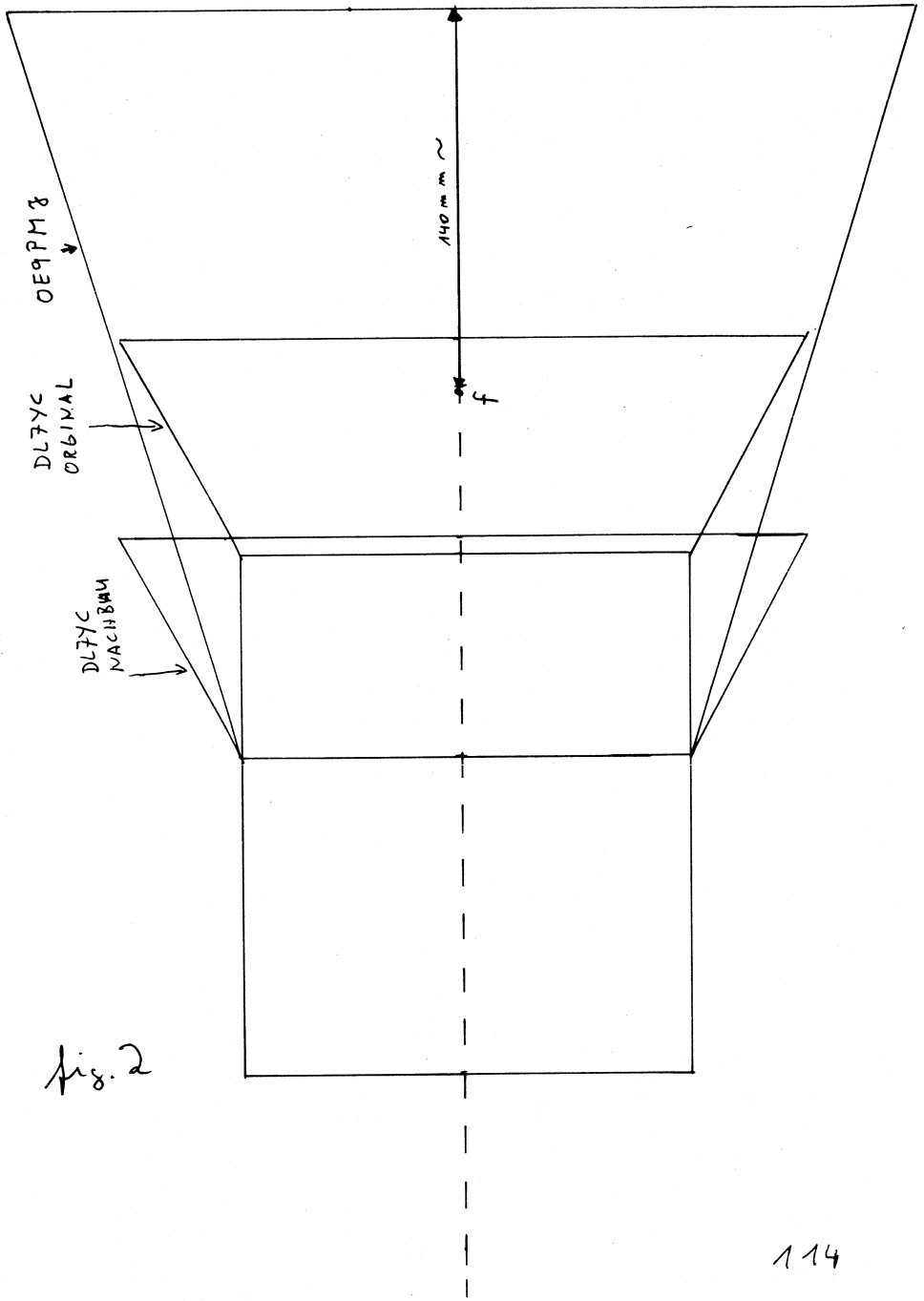
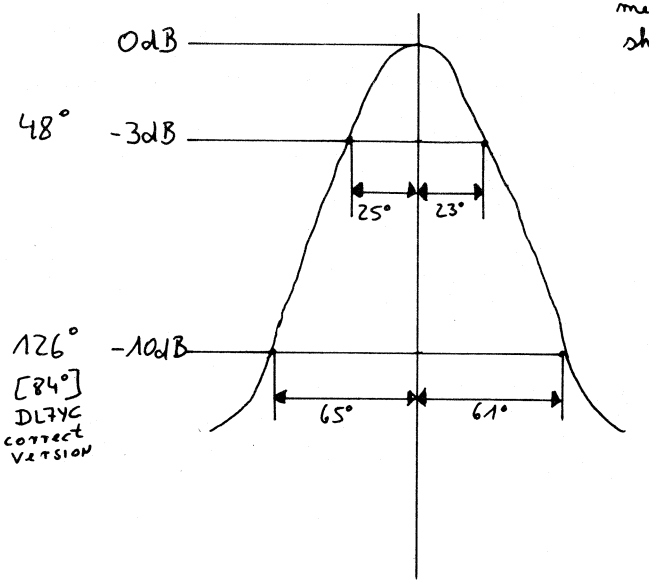
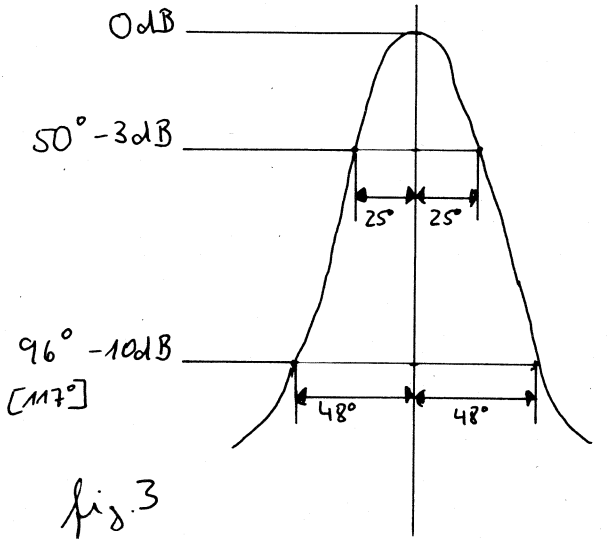


fig. 2

DL7YC's feed horn
measurement by DE9PMJ
short version " "



E-plane



H-plane

fig. 3

OE9PMJ's feed horn

1296 Mc

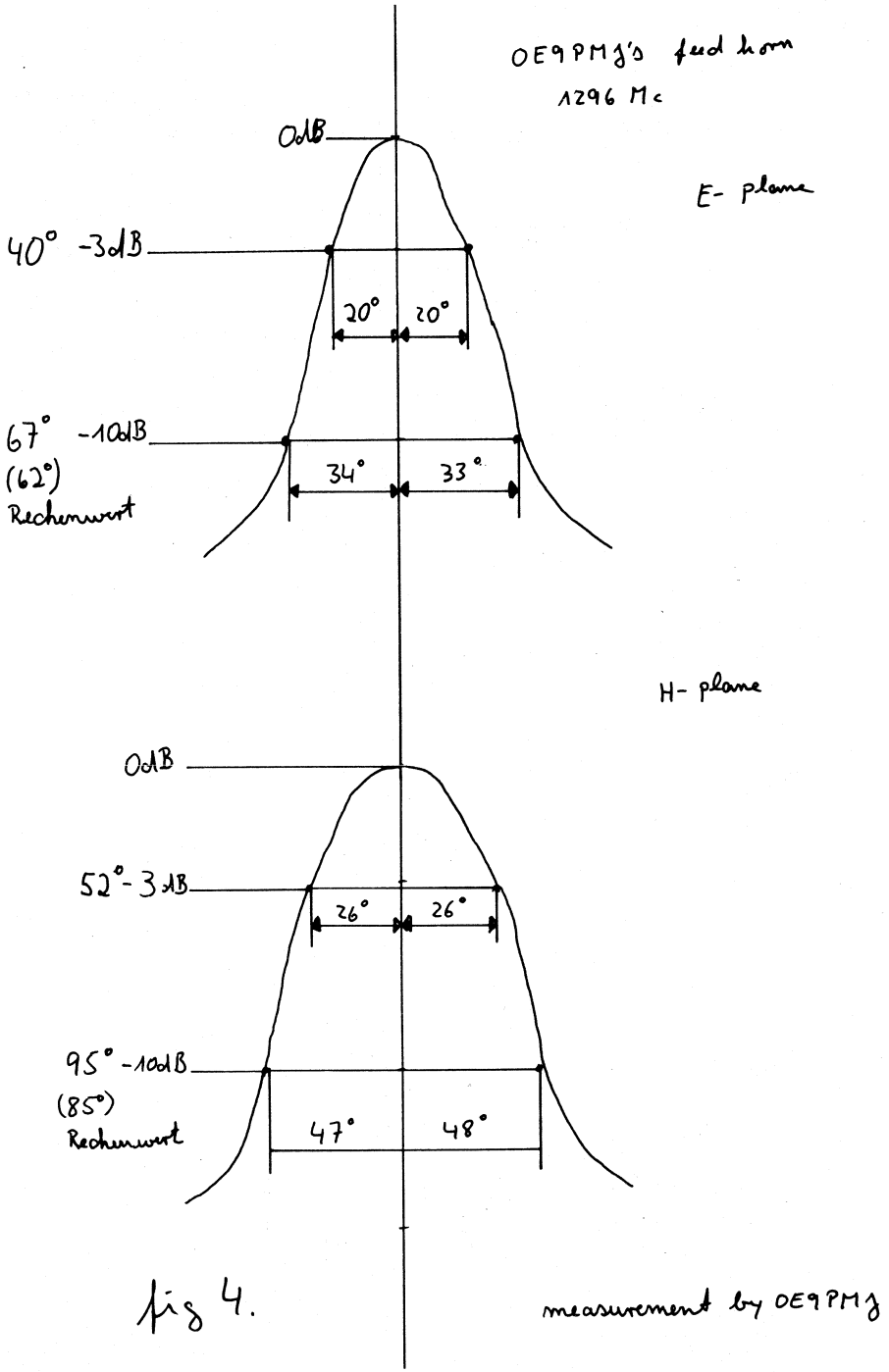


fig 4.

measurement by OE9PMJ

Tab. 1 (Circular feed horn 1296 Mc)

	E-plane (-3 dB)	H-plane (-3 dB)	E-plane (-10 dB)	H-plane (-10 dB)	
DL7YC to short	(+23/-25°) 48°	(+/-25°) 50°	(+61/-65°) 126° [84°]	(+/-48°) 96° [117°]	
DL7YC orginal	(+22/-23°) 45°	(+/-25°) 50°	(+/-50°) 100°	(+/-48°) 96°	
OE9PMJ	(+/-20°) 40°	(+/-26°) 52°	(+33/-34°) 67° [62°]	(+48/-47) 95° [85°]	

[values] are calculated values

CORRECTION

by LA 8 AK

E. : DUBUS information nr. 4/82 page 249
Pse note : a 2.2 K resistor must be used between S2A/S3 to protect IC2 (CD4020) for logic-high level from START KEYER.
A similar unit using a 4474 KHz xtal is now in use.

4/82 page 246
A simplified version may consist of only two OP-amps, the oscillator and the comparator. +9V is stabilized by a ZD(1N5239B 400mW).
Output from comparator goes to 1N4148 and 1 K resistor.

D. : DUBUS Informationen Nr. 4/82 Seite 249
Es muß ein 2,2 K Widerstand zwischen S2A/S3 eingestzt werden, um das IC2 (CD4020) zu schützen gegen logische "high" Signale vom START KEYER.
Eine ähnliche Schaltung wird jetzt benutzt mit einem 4474 KHz Quarz.

4/82 Seite 246
Eine einfachere Ausführung kann aus zwei OP-Verstärkern nur bestehen, dem Oszillator und dem "Vergleicher". Die +9V werden durch eine ZD (1N5239B 400mW). Der Ausgang des Vergleichers geht zur 1N4148 und zum 1K Widerstand.

To be reported in the next issue :
Im nächsten Heft wird berichtet :

Application of Microwave GaAs FETs (Part II)
6 cm Preamp. and ampl. and a noice generator by DC8UG

APPLICATION OF MICROWAVE GaAs FETS

by

INTRODUCTION

The history of converting microwave communications, as well as other communications technologies, to solid state electronics is a long one. Early advances were first made in receivers, and then in transmitters. Progress in bipolar transistor technology and the production of new semiconductor crystals during the 1960's made possible the development of such new microwave diodes as the GUNN and the IMPATT (impact avalanche and transit time). For this reason, the decade might well be called the renaissance of microwave semiconductor devices. A series of microwave communications amplifiers appeared in the first half of the 1970's which used GUNN and IMPATT diodes. They played a leading role in the trend toward solid state technology. In the middle of the same decade, a commercially feasible gallium arsenide field effect transistor (GaAs FET) appeared, and the uses of this device are still increasing. In the latter half of the 1970's, demands grew for systems more reliable than those using IMPATT and GUNN diodes. Users were demanding greater reliability, and those engaged in research and development began working toward this goal. The work is still going on today.

The demands of the industry turned the emphasis away from creating new devices to developing competition among manufacturers of semiconductors to produce devices of higher performance and greater reliability. Commercialization of GaAs field effect transistors led to lower energy consumption and smaller microwave components and systems. These are still major concerns today. With new developments in information, communications and applied microwave systems, the GaAs FET has become an indispensable item.

I. THE FIELD EFFECT TRANSISTOR (FET)

In 1952, Shockley conceived the structure of the field effect type transistor and pointed out that it could be used for amplifier devices. Due to manufacturing difficulties, particularly in production technology, the field effect transistor was little known until the early 1960's. The level of technology at the time made it very difficult for people to understand the importance of the FET. But with the development of planar technology, the microwave semiconductor industry grew with explosive rapidity.

There are three major types of FETs. The simplest of the three is the junction FET (JFET). Because of its simplicity and ease of manufacture, the JFET was the earliest to be produced commercially. It was put on the market about the same time as the first microwave bipolar transistor.

With the development of semiconductor manufacturing technology and the need for lower energy consumption, the metal oxide semiconductor FET (MOSFET) appeared. The MOSFET, like the JFET, was first developed for applications in circuits that demanded high impedance, such as input circuits in analytical instruments. Field effect transistors, particularly the MOSFET, became widely known for their use as discrete devices in UHF band communications. However, having focused solely on performance for many years, nothing in the microwave band appeared on the market which was superior to the bipolar transistor.

Around the time silicon reached its peak as a transistor material, Schottky barrier type FETs made of gallium arsenide appeared and quickly gained popularity by demonstrating their high theoretical performance. This new device, known as the Gallium Arsenide Metal Semiconductor FET (GaAs MESFET) showed performance far superior to the bipolar transistor.

This new device provided lower noise and higher gain in established solid state applications. It also provided high frequency characteristics previously unavailable from bipolar transistors. It is made by using gallium arsenide (group III-V); one of the semiconductor compounds which has been researched continually since the latter half of the 1960's. The electron mobility of gallium arsenide is five to seven times that of silicon.

Gallium arsenide crystal technology was used to produce the GUNN, varactor and Schottky diodes, and proved to be far better than silicon in high frequency performance. A GUNN diode made of silicon would be inconceivable, so the appearance of the contemporary GaAs FET contributed greatly to developing and commercializing the GUNN diode. The reason for this is that even though the GaAs MESFET is a three terminal device, it is simple in structure and its performance depends only on the crystal quality. Advances in crystal technology have made the commercialization of FETs possible.

The GaAs FET is what is generally referred to as a "normally ON" type device. Its basic difference from the MOSFET is the use of a Schottky barrier at the gate instead of an oxide layer. This is an extremely important point. In other words, almost no GaAs FET gates are insulated from the channels in terms of direct current. Thus, even though GaAs FETs are called "normally ON" type devices, the maximum gate voltage must be zero. It does not use a dielectric like the MOSFET,

so if a positive voltage is applied at the gate, direct current flows through it. Since the gate is a very small piece of metal (0.5μ—1.0μ—2.0μ), the gate electrodes will fuse completely in almost all cases.

Figure 1 shows the properties of a GaAs MESFET. In almost all cases, a linear amplifier circuit biases the GaAs MESFET. This applies to other circuits as well, but considering gate bias alone, the range must be from I_{DSS}, i.e., $V_G = 0$ V, to $I_{DS} = 0$ (at pinch off, $V_G = V_P$). In this range, the voltage V_{DS} between the drain and the source has little effect on the current I_{DS} flowing through the channels. By changing the gate voltage, V_G, the drain to source (channel) current can be controlled. Figure 2 shows the transfer characteristics of a GaAs FET with n channels. This FET transfer characteristic is an important basic parameter in circuit design because it sets the bias conditions and operating point. The operating point line in Figure 2 is directly related to the mutual conductance, g_m.

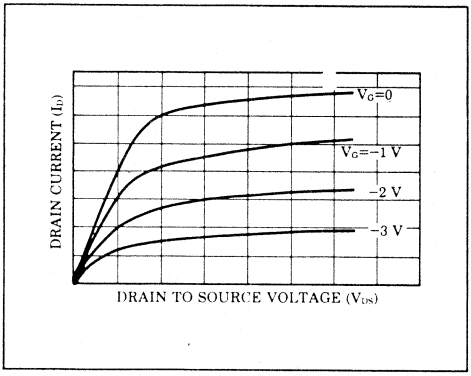


Figure 1. Typical GaAs FET DC Characteristics

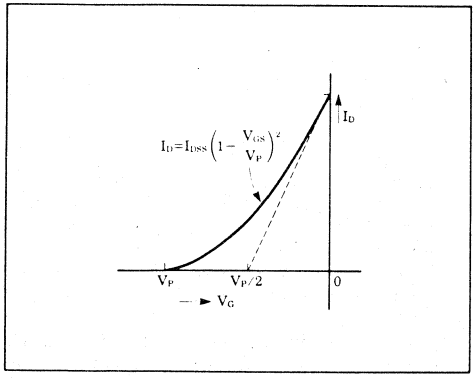


Figure 2. Square-Law Characteristic

Mutual conductance is defined as the ratio of the change in direct current to the minor change in voltage between gate sources. This is generally described as the square-law characteristic and is shown in the equation for I_D in Figure 2.

$$I_D = I_{DSS}\left(1 - \frac{V_{GS}}{V_P}\right)^2 \qquad (1)$$

When I_D in expression (1) is differentiated with respect to V_{GS}, the result is

$$\frac{dI_D}{dV_{GS}} = -\frac{2I_{DSS}}{V_P}\left(1 - \frac{V_{GS}}{V_P}\right) = g_m \qquad (2)$$

and the mutual conductance for each value of V_{GS} can be obtained.

II. GaAs FET BIAS AND OPERATING POINT

The most important characteristic to consider when designing a bias circuit for small signal GaAs FETs is the previously mentioned transfer characteristic. Generally, two methods can be used to bias a GaAs FET.

1. Dual Power Source Method

Figure 3 shows a bias circuit which uses the dual power source method. Since the condition

$$V_P < V_{GS} < 0$$

must always apply to a GaAs FET, V_{GS} can be derived from expression (1)

$$V_{GS} = V_P\left(1 - \sqrt{\frac{I_D}{I_{DSS}}}\right) \qquad (3)$$

2. Self Bias Method (Auto-Bias)

Figure 4 shows the most universal method for reducing electrical potential between a gate and the source when there is only one power source. If the source resistance is R_S, and the operating current is I_D, then the drop in electric potential caused by R_S will be

$$I_D \times R_S$$

The actual electrical potential between the gate and the source will be

$$V_{GS} = -I_D \cdot R_S \qquad (4)$$

which is negative, so the FET can be turned on. The value R_S is obtained by combining expressions (3) and (4).

$$R_S = -\frac{V_{GS}}{I_D} = -\frac{V_P}{I_D}\left(1 - \sqrt{\frac{I_D}{I_{DSS}}}\right) \quad (5)$$

Therefore, these are the basic bias principles.

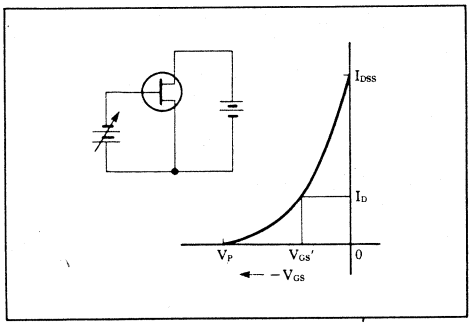


Figure 3. Dual Source Bias Method

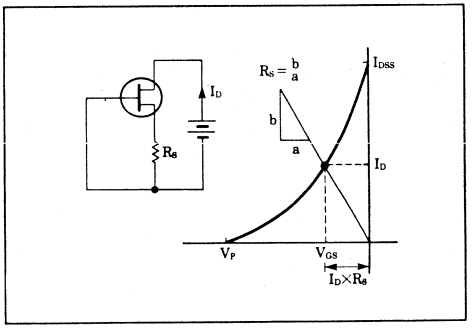


Figure 4. Self (Auto) Bias Method

Figure 5 shows the five general bias types: A, B, C, D, and E. Type A is the previously described dual power source bias method appropriate for use in the higher frequencies. When directly connecting the source to the ground terminal, source inductance can be made relatively small. By using this method, higher gain can be obtained and a lower noise factor anticipated in the higher frequencies.

All other bias methods insert a bypass capacitor into the source. Even if the high frequency performance of the bypass capacitors can be guaranteed, there will always be a loss (tan δ) resulting from the material's dielectric properties. Even with chip capacitors, there is always some inductance and care must be exercised when using them at higher frequencies. Types D and E in Figure 5 require only one power source. They are compatible with the previously described method. An advantage of this method is that if the source voltage should increase for any reason, that increase will be proportionate to the drop in potential caused by R_S, which is connected in series with the source,

$$R_S \times \Delta I_D$$

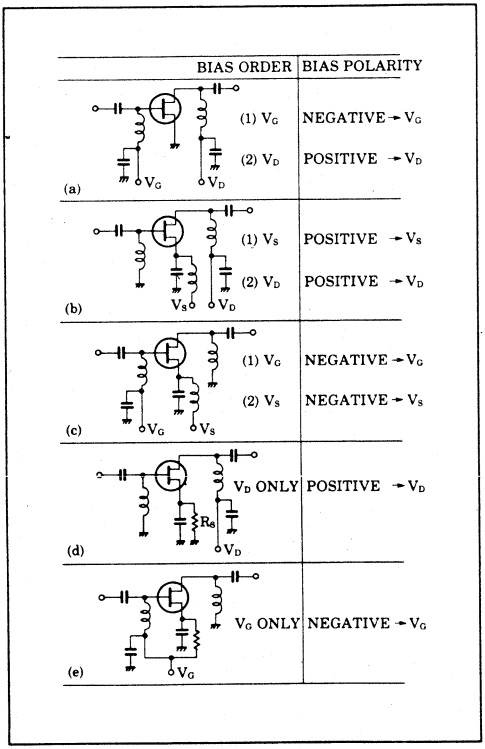


Figure 5. GaAs FET Bias Circuits

Here, ΔI_D is the increment in drain current caused by the increment in source voltage.

Drain current increase will be automatically suppressed, due to the proportionate negative bias on the gate. Generally, if a single source type (self-biasing type) is selected, D is used; if the only available source is a negative one, then E should be selected.

Figure 5 shows the order for adding bias when a dual power source is used. This is to prevent, as

much as possible, a large current from flowing through the FET. The GaAs FET being discussed here generally has a high mutual conductance, giving it excellent frequency characteristics. If the gate voltage is near zero, g_m is at a maximum and oscillation may occur. For this reason, a bias scheme should be adopted that first applies a negative bias to the gate and then turns on the drain with a positive bias. There are slight differences between a bias circuit for a small signal GaAs FET and one for a power GaAs FET, but the above methods can be considered for both.

Moving one step further, let's examine a practical bias circuit. It is important to:

1. Obtain the necessary operating voltage and operating current, and
2. Ensure a high level of stability.

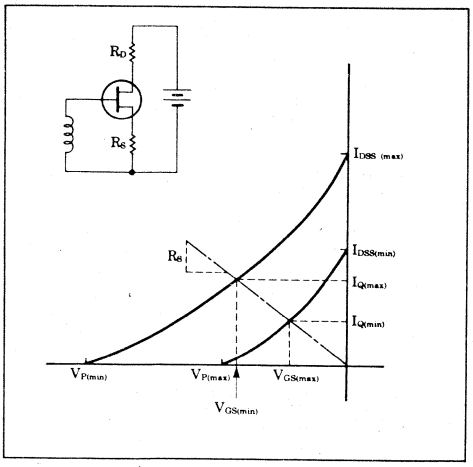


Figure 6. Possible Bias Points

Figure 6 shows the bias graph, indicating all possible bias points. Bias will be in the range determined by

$$V_{GSQ} = I_Q R_S$$

Given the bias range, the operating point for the maximum amplitude value, P, and the operating point where there is no signal, Q can be obtained. The change in I_Q from point P to point Q, or ΔI_Q, becomes

$$\Delta I_Q = I_{Q(max)} - I_{Q(min)}$$

This shows that with a variation in I_Q, the drain voltage will change only as $R_D \cdot \Delta I_Q$. If the signal midpoint is not fixed at the center of the bias line and wanders off in some direction, the wave form will be distorted. Also, the amplification operation will be degraded, and DC will flow through the gate. In a similar manner, the maximum variation in voltage between the gate and the source when there is no signal is

$$\Delta V_{GSQ} = V_{GSQ(max)} - V_{GSQ(min)}$$

I_Q is a function of both the temperature, T, and V_{GSQ}

$$I_Q = f(T, V_{GSQ})$$

If, with a variation in temperature of δT, I_Q changes by only δT_Q.

$$\delta I_Q = \frac{\partial I_Q}{\partial T} \cdot \delta T + \frac{\partial I_Q}{\partial V_{GSQ}} \cdot \delta V_{GSQ}$$

$$= \frac{\partial I_Q}{\partial T} \cdot \delta T - g_m \delta I_Q \cdot R_S$$

and from this

$$\delta I_Q (1 + g_m R_S) = \frac{\partial I_Q}{\partial T} \cdot \delta T$$

is obtained.

If $R_S = 0$, that is, if there is no series resistance, then

$$\frac{\partial I_Q}{\partial T} \cdot \delta T = \delta I_Q (0)$$

represents the drift. The bias stability coefficient is defined as

$$S = \frac{\textit{Fluctuation in } I_Q \textit{ with respect to } R_S}{\textit{Fluctuation in } I_Q \textit{ independent of } R_S}$$

$$= \frac{\delta I_Q}{\delta I_Q (0)} = \frac{1}{1 + g_m R_S} \qquad (6)$$

This means that fluctuation in the entire circuit is reduced by means of negative feedback due to R_S. This effect is particularly important when using small signal FETs.

Figure 7 gives an example of a bias circuit. Since I_{DSS} and V_P often vary between devices, it is important that the bias circuit can absorb such variation, the optimum operating point can always be established, and operation is stable regardless of ambient temperatures. The circuit in Figure 7 is basically a fixed bias circuit and not a

self-bias circuit. Feedback is applied to the circuit by the insertion of R_S into the source.

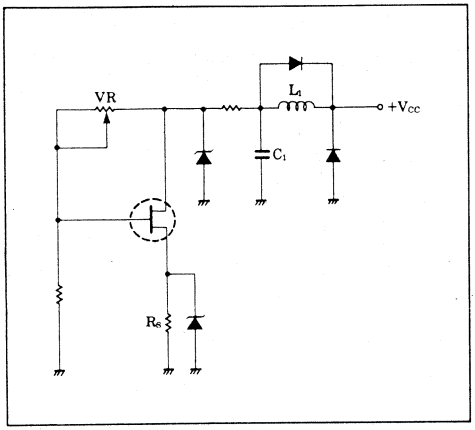


Figure 7. A Low Cost, Stable Bias Circuit

As stated previously, since the voltage between the gate and the source is $V_{GS} = -I_D R_S$ in a self-bias circuit, and if I_D is known, R_S can be readily determined. In such a fixed bias circuit as the previously mentioned dual source type, the gate voltage is selected independently of R_S and I_D. Thus, it is understood that the value R_S can be higher than that when using a self-bias circuit, and the stability coefficient S can therefore be improved.

III. GaAs FET CHARACTERISTICS AND APPLICATIONS

In this section, examples and explanations of GaAs FET applications will be given. The first issue is the argument as to whether or not the FET is better than the bipolar transistor because of the FET's cross modulation characteristic. Discussion will then turn to applications of the small signal FET and the large signal or power FET.

1. Distortion Factor

The transfer characteristic of a GaAs FET can be approximated using a quadratic equation, as was shown in expression (1). If the transfer characteristic could be perfectly represented by such an equation, then the second harmonic will increase to its maximum and will actually include the higher order harmonic components. To determine the value of the second harmonic for a basic frequency, substitute the total input voltage and total output current into the equation.

If there is no signal, the drain current I_D is

$$i_D = I_{DSS}\left(1 - \frac{v_{gs}}{V_P}\right)^2 \qquad (7)$$

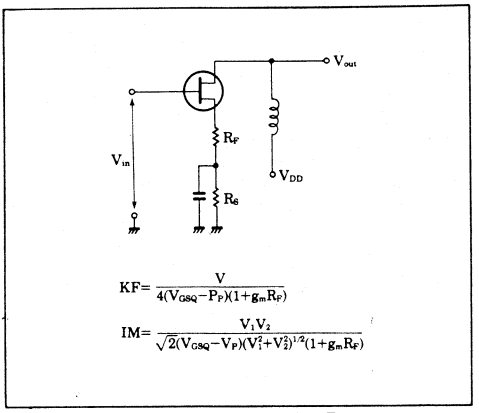


Figure 8. Improving the Distortion Factor Using a Series Feedback Resistance R_F

Adding a simple sine wave voltage $(V \sin \omega t)$ to the non-signal voltage results in

$$v_{gs} = V_{GSQ} + V \sin \omega t$$

If the expression is rearranged and substituted into the following, then the harmonic distortion KF is

$$KF = \frac{\textit{Relative value of second harmonic}}{\textit{Relative value of fundamental harmonic}}$$

$$= \frac{V}{4(V_{GS} - V_P)} \qquad (8)$$

V is the maximum amplitude of the signal.

As expression (8) shows, the distortion factor approaches its minimum as V_{GSQ} approaches zero. However, as the input signal increases and enters the realm of forward gate bias, quite naturally the distortion factor increases.

Next, we will consider what happens to the cross modulation (intermodulation) produced when two sine wave signals are amplified at the same time. That is

$$V_{GS} = V_{GSQ} + V_1 \sin \omega t + V_2 \sin \omega t$$

Since the output current includes the sum and difference components of two sine waves, cross

modulation (intermodulation) distortion, *IM*, is defined as follows:

$$IM = \frac{\text{Relative value of}}{\text{Relative value of}}$$

$$\frac{\text{cross modulation component}}{\text{fundamental harmonic}}$$

$$= \frac{V_1 V_2}{\sqrt{2}(V_{GSQ} - V_P)(V_1^2 + V_2^2)^{1/2}} \qquad (9)$$

Even here, we see that the distortion factor decreases as bias is brought closer to $V_{GSQ} = 0$. The main cause of the distortion is the curve (non-linearity) in the transfer characteristic line, but there are other causes as well.

Distortion can also be caused by the change in output conductance, g_d, related to the operating point and the drain voltage, V_{DS}. To improve distortion, carefully select g_m and g_d, which to a certain degree work to reverse this effect.

Another point to consider is that since distortion can be produced internally, *KF* and *IM* can both be improved by applying feedback to the circuit.

As shown in Figure 8, by adding a resistance, R_F, in series with the source resistance, the distortion factor for the non-bypass feedback is calculated, using expressions (10) and (11).

$$KF = \frac{V}{4(V_{GSQ} - V_P)(1 + g_m R_F)} \qquad (10)$$

$$IM = \frac{V_1 V_2}{\sqrt{2}(V_{GSQ} - V_P)(V_1^2 + V_2^2)^{1/2}(1 + g_m R_F)} \qquad (11)$$

By applying feedback to the circuit, both the distortion factor and the bandwidth can be improved. The value of R_F will reduce the total gain only by its relative portion. It is possible to have a wide-band amplifier with a low distortion factor by initially designing the amplifier for high gain and tuning the gain to its optimum level by using feedback.

2. Small Signal FET Applications

The first practical and commercially available GaAs FET was introduced around 1973. Since then, many small signal amplifying devices with 1 μm gate lengths and smaller have been marketed.

The greatest advantages for these devices are found in the higher frequency bands. Compared to the silicon bipolar transistors and tunnel diodes, GaAs FETs are far better in terms of noise, gain and output-power saturation characteristics. Other than their primary use in ultra-high frequency amplifiers, such as those for electronic countermeasures (ECM), most small signal FET applications are in low-noise amplifiers. They are used in both line-of-sight and over-the-horizon microwave communications, and in earth stations communicating with satellites.

A low noise amplifier is designed by minimizing the noise measure, *M*, shown in expression (12).

$$M + 1 = 1 + \frac{NF - 1}{1 - (1/G)} \qquad (12)$$

NF is the amplifier noise factor.

G is the amplifier gain.

In single-stage amplifiers, the general procedure for matching input circuits is to mimimize the noise factor, NF; for matching output circuits, the gain is maximized.

From observations of the input-output impedances of a GaAs FET, it is noted that there is generally a difference in impedance between maximum gain and minimum NF. This difference is particularly apparent at lower frequencies. As the frequencies go higher, the difference seems to decrease. The noise factor, which is a function of device gain, will be low when the gain is maximized at high frequencies. However, of the commercially available GaAs FETs having characteristics which allow a gain of 8 to 10 dB or more, there is still a difference between the impedance at maximum gain and the impedance at miminum NF. This difference will be seen until the frequency range approaches the X band.

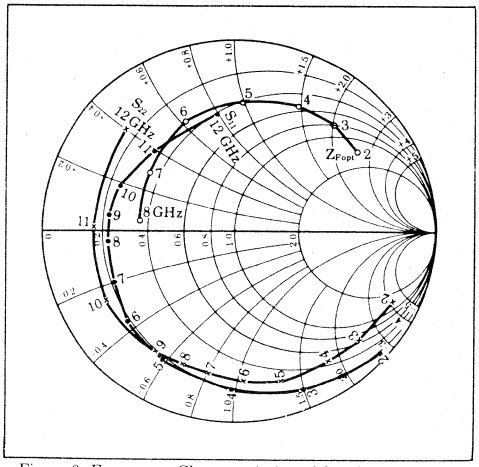


Figure 9. Frequency Characteristics of S_{11}, S_{22}, and Z_{Fopt} in the NE24406

Figure 9 shows S_{11} and S_{22}, indicating input-output impedance for the NE24406 and the signal source impedance when the noise factor, NF, is minimized. Circuits can be matched using these impedances. As mentioned previously, input circuit matching is accomplished by matching to Z_{Fopt}; and output circuit matching is accomplished by matching to S_{22}.

In the design of a multi-stage amplifier, the first and second stages are designed so that $(M + 1)$ will be minimized, and the third and subsequent stages are made in such a way that their gain is maximized. Or, alternately, the amplifier can be designed according to the characteristics determined by the frequency and the device.

One impedance matching circuit, shown in Figure 10(a), is the well known Tchebycheff filter type multi-stage impedance matching circuit. The distinctive feature of this circuit lies in its applicability to the input/output circuits of wide-band amplifiers. In many cases, the circuit is used in amplifiers covering the band range 8 GHz to 12 GHz and above. Although this type of matching network was originally applied to comparatively narrow bands (such as a 500 MHz bandwidth at 4 GHz), the matching circuits shown in Figure 10(b) and (c) are now believed to be best suited for bands having approximately a 10 to 15 percent ratio to the amplifier's center frequency.

For these bandwidths, the NF can be reduced to its lowest absolute value. If the widest possible bandwidth is the objective, then reduction of the NF to its absolute minimum is not possible throughout the band. In the former amplifier, the most important consideration is reducing, as much as possible, the loss in the impedance matching circuit. The Tchebycheff filter type impedance matching circuit in Figure 10(a) uses a large number of components and is not well suited for obtaining a low loss matching network.

As Figure 9 shows, both S_{11} and S_{22} go from capacitive to inductive with increasing frequencies. Consequently, S_{11} and S_{22} can use the circuit in Figure 10(b) for frequencies which exhibit a capacitive response, or the circuit of Figure 10(c) for the frequencies which exhibit an inductive response. In Figure 10(b), for frequencies slightly higher than the amplifier's center frequency, the GaAs FET input or output has a resonance of either L_1 or L_2 (with a reactance of 0), which is then matched to the desired impedance by the $\lambda/4$ impedance conversion circuit. This is only one of the countless possible impedance matching circuits. However, this is a very effective design method for low noise amplifiers requiring a band ratio of 10 to 15 percent when the amplifier's center frequency is 4 GHz or greater.

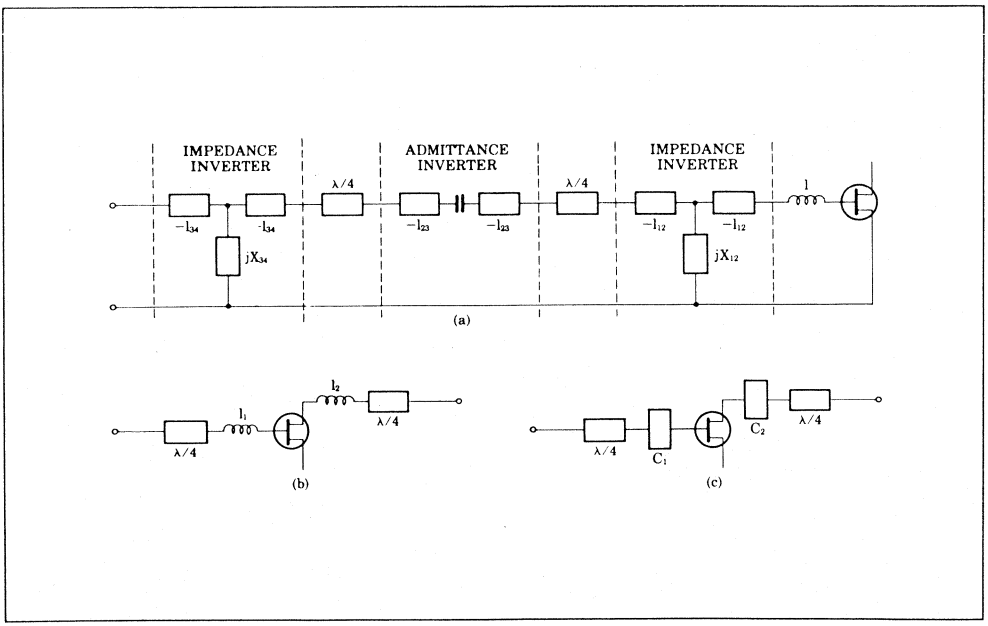
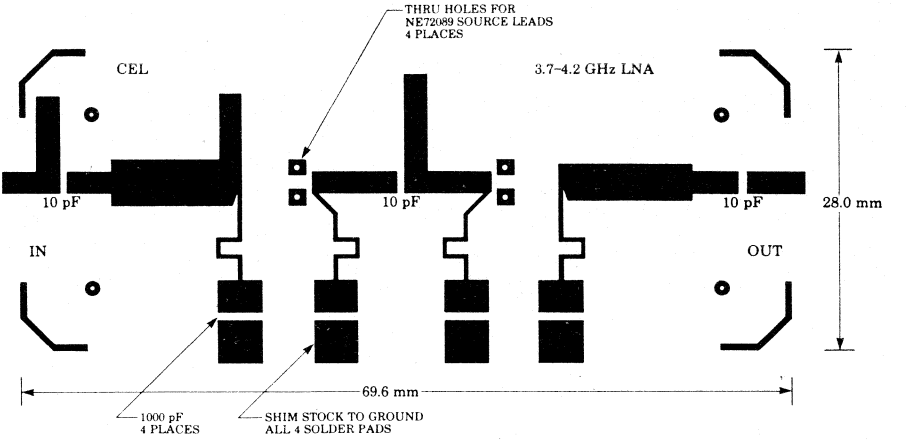


Figure 10. GaAs FET Matching Networks

3. Low Noise Amplifiers in the 4 GHz Band

Figure 11 is an example of a two-stage low-noise amplifier for the 3.7 to 4.2 GHz band using either the NE21889 or the NE72089. The matching circuit in Figure 11 is based on the same idea as Figure 10(b). It uses a microstrip with an 0.8 mm thickness teflon glass fiber substrate and transistor leads with lumped constant inductance. Figure 12 shows the schematics. Figure 13 shows the gain and noise factor normally obtained using this circuit.



Parts List: NE72089 FET (2 ea.) California Eastern Laboratories
10 pF Chip Capacitors (3 ea.) ATC #100A-100-J-P-X-50 or equivalent
1000 pF Chip Capacitors (4 ea.) Johanson #50R11W102KP or equivalent
1500 pF Feed-through Capacitors (4 ea.) Erie #2425-003-W5U0152AA or equivalent
Ferrite Beads (4 ea.) Fairrite #2643001301 or equivalent

Figure 11. PCB Layout of a 2-Stage Amplifier in the 3.7 GHz–4.2 GHz Band (actual size)

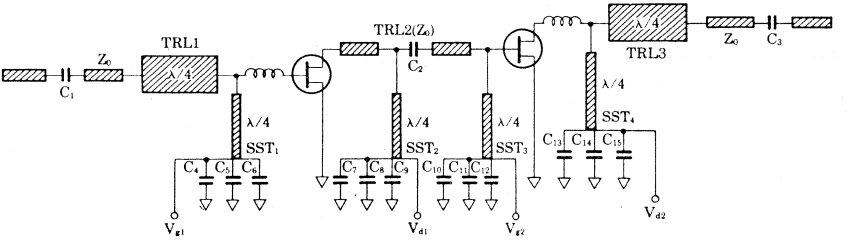


Figure 12. Schematics for a 3.7 GHz–4.2 GHz Band 2-Stage Amplifier

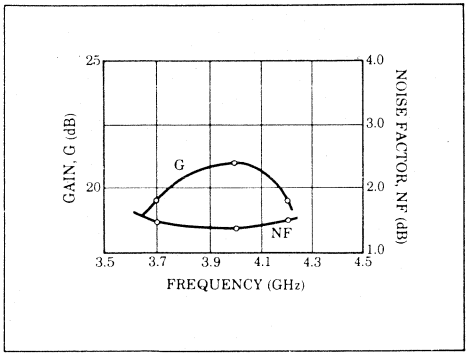


Figure 13. Frequency Characteristic of NF and G for the NE72089 2-Stage Amplifier

This two-stage amplifier uses the inductance in the first stage input section to produce resonance. Then, using the $\lambda/4$ impedance transformer, it forms a matching circuit for the 50Ω characteristic impedance. Since there is a relatively small difference in values between S_{11} and S_{22}, the intermediate stage matches impedance by the simple means of a transmission line.

Output matching is done in the same way as in the first step, i.e., the matching circuit shown in Figure 10(b) is used. Figure 11 is a full-scale pattern showing lines and open stubs inserted in parallel. Although these are not necessary for the ideal design, they are included to correct impedance matching problems caused by the printed circuit board connectors (microstrip to coaxial connection) and the DC blocking chip capacitors. They are inserted after the design is completed.

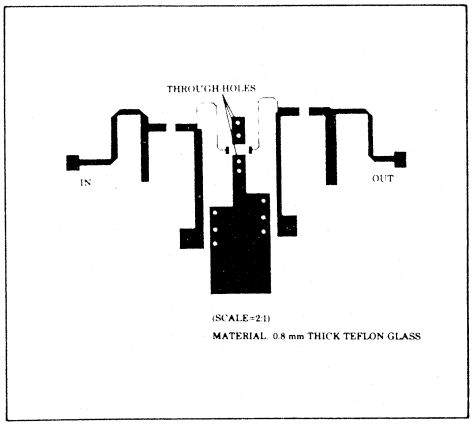


Figure 14. PCB Layout for 1.0–1.4 GHz Amplifier

4. Low Noise Amplifiers in the 1 GHz Band

Figure 14 shows a PCB layout for an amplifier designed for low noise operation in the 1 to 1.4 GHz band. Since the microstrip lines used are very thin, the diagram shown here is twice the actual size. During the design, it should be drawn four times the actual size and then reduced.

Figure 15 shows the equivalent circuit. In the design of this circuit, a band ratio of 10 to 15 percent was not obtained as with the previous amplifier. Instead, emphasis has shifted to making the band as wide as possible and the noise factor as low as possible. Since it is in the relatively low-frequency 1 GHz band, the loss due to the reactance elements (including the microstrip) was not given much concern. The Tchebycheff filter type multi-stage impedance matching circuit would have been used. However, considering the frequencies involved and the large physical size of such a circuit, a method was chosen that gives the transmission line as high an impedance as possible for input and output, and which would gradually match to the characteristics impedance of 50Ω. Figure 16 shows the typical performance characteristics of this amplifer.

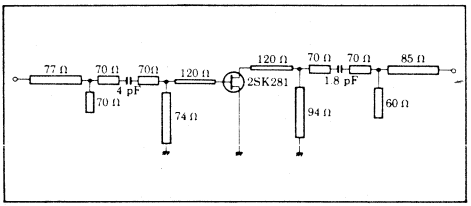


Figure 15. Equivalent Circuit for a NE72089 Low-Noise Amplifier

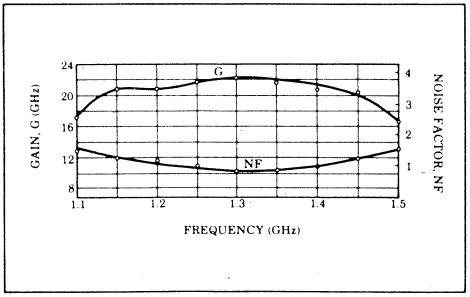


Figure 16. NE72089 Low-Noise Amplifier

When this amplifier was designed, a 4 pF blocking chip capacitor was used as part of the matching circuit, as shown in Figure 15. The input

matching circuit was designed chiefly to obtain matching for the noise factor. The data used for the NE72089 is shown below:

f	Γ_{Fopt}*	F_{min}	G	NF @ 50 Ω
1 GHz	0.59<32.5	0.6 dB	17.5 dB	1.73 dB
1.3 GHz	0.65<47.0	0.6 dB	15.0 dB	1.74 dB

V_{DS} = 3 V, I_{DS} = 10 mA

*(Γ_{Fopt} signifies the reflection coefficient obtained when comparing the signal course impedance with 50Ω when NF is minimized.)

The bias circuit used to actuate this amplifier is shown in Figure 17. The figure shows a bias circuit for a two-stage amplifier. For a single stage amplifier, only one half of the redundant portion of the circuit would be used. This circuit is a constant voltage, constant current type bias circuit, one of the most applicable examples of circuits for use in small-signal amplifiers.

5. Applications to Other Amplifiers

(A) A technique of attaining wide band performance by inserting a source inductance.

L. Neven, et al., have proposed a type of feedback circuit for relatively low frequency GaAs FET amplifiers. For amplifiers operating in the 1 GHz to 2 GHz range, these circuits guarantee a low noise factor as well as good input-output impedance.

Figure 18 shows what is considered the universal GaAs FET equivalent circuit. In this circuit, drain noise current, I_{dn}, is referred to the input by the Vander-Ziel theory, then the gate source resistances, R_i, becomes noiseless and, R_S remains noisy. The noise currents at the gate and drain have been removed from the two-port. The circuit in Figure 18 is better handled by computers, where the noise and signal are compared as a function of the externally added source inductance. In this instance, it is easier to consider the equivalent circuit shown in Figure 19.

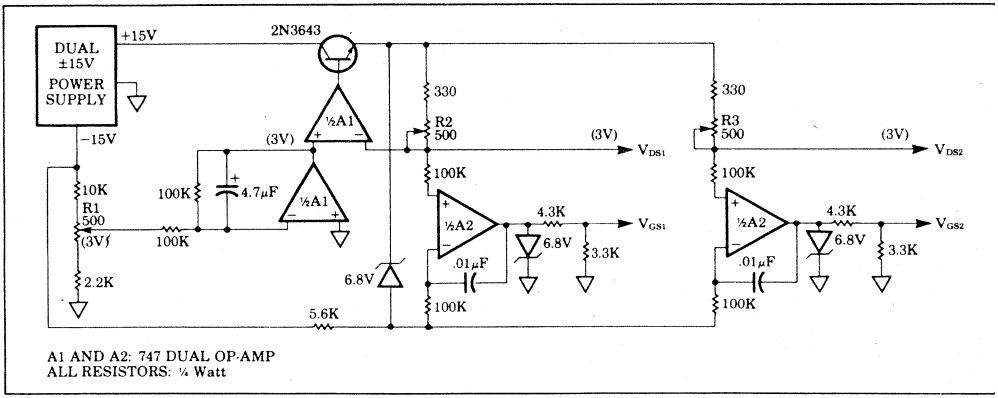


Figure 17. Two Stage GaAs FET LNA Bias Supply

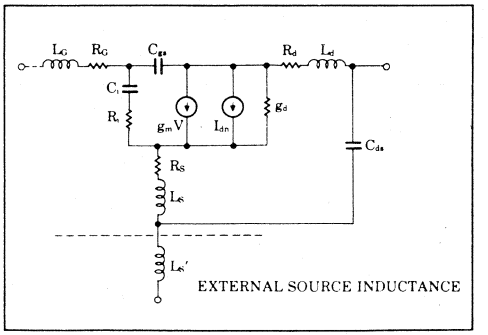


Figure 18. Universal GaAs FET Equivalent Circuit

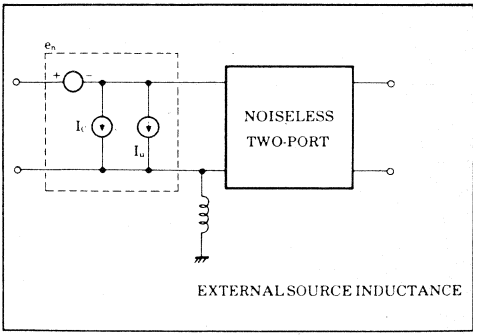


Figure 19. Cascade Connection of Device's Noise and S-Parameter Equivalent Circuits

To be continued in DUBUS Info 3/83

MICROWAVE NEWS

by DL7QY

I2FUM reports:..I am qrv on 23cm during contests from "EE"; now I have 10W and MGF1400. Now in Italy there is a certain activity on 23cm; abt 100 OM's and 40 QSO's in Contest. Also on 13cm there are 10 OM's and abt 6 QSO's in contest. We are on 2304 MHz according to the new Italian plan. tks fer info Toni

IOFHZ in GC21f wkd on 1296 MHz at 2120 GMT on 13.7.1982 CN2BL in YV56c. two way SSB. The qrb is 1520km! Ennio wants skeds with DL stations. He is every evening qrv at 1296.140 MHz. For skeds write to: Ennio Tonon, IOFHZ, Torre S. Severo 176, I-05018 ORVIETO TR. ITALY

F1FHI (ZH63d) wkd on 23cm, 22nd Jan. 1983: HB9AMH/p DH. On 23rd Jan. 83 G3LQR AM, G4FXW ZN, G3LRP ZN, G3HHD ZO (1W), G3AVS YK, G4KCT ZN, G8SPI ZN, G8TXG YM, G4CBW YN, G3WOH YN, G4KIJ ZM, G8SWZ YM (475mW), G6FK YM, G3APY ZN, GU3KFT YJ, G8JHL YN (1W), G4KGC ZL, G3NNG ZL, GW8TVX XL (1W), G3GNR XK, G4MAW YK, G4ROB ZN (1W), G4PMK ZL, G8HPU AM, G3PBV YK, G3JXN ZL, G8VRJ ZN, F1FWP ZF (200mW), G4AQB YN (30mW!!!+800km), G3LTF AL, G8MWR ZM. On 7th March 1983 G3OBD ZK, F6CIS ZE, F1BUU ZE. On 10th March 1983 F9XG AJ, F6DWG BJ, DL7QY FJ, DL3NQ EJ, F1SA CI and G6GN YL. tks fer info Jean

DB6BX in DM46c wkd on 1296 MHz on 3rd Sept. 1982 at 2055 GMT G3TDG in AL51g. On 4th. Sept. 82 at 0120 OE2KMM in GH16c. On 5th Sept. 82 at 0650 OE2KMM in GH16c and at 0740 DC9NH in FJ56j. On 11th Sept. 82 at 2150 DC3XY in EN20e. On 14th Sept. 82 at 1940 G8PPR in ZN22h. At 2110 G3TDG in AL51g. At 2115 G3GRO in ZL80h. At 2345 OZ7LX in FP49c. At 2350 OZ1ABE. On 15. Sept. 82 at 2100 HB9AMH/p in DH66c. On 17th Sept. 82 at 2100 G3ZEZ in AL16f. At 2110 G4KIY in ZM40j. On 18th Sept. 82 at 0110 G4KDH in AL34h. On 29th. Oct 82 at 2225 OE2CAL in GH16c. On 30th Oct. 82 at 0950 OK1AIY/p in HK28c. At 1340 DC2CT in FI68j. At 1440 F1FHI in ZH63d. At 1930 DK8VR in DJ55c. At 2050 F6GCJ in AG13a. On 23rd Jan. 1983 at 1410 DJ6GQ in EI13j. tks fer info Peter

OE1ERC/9 in FH41h (1000m asl) wkd on 1296 MHz qrb > 400km: On 5th March 1983 DK2UO DL, DJ5BV DK, DC8DC/a DL. On 6th. 3. 83 DL0HC DL, OD3KL DK, DL9LU DK, DF1EQ DL, DJ3ZU DL (507km odx), PA0JRS/A CK and DF3EE DL. On 7th May 1983 DJ3ZU DL, DK2UO DL, DJ5BV DK, DL0HC/p DL and DF1EQ DL. On 2320 MHz > 200km: On 5th 3. 83: DK6IJ EJ, DJ9VS EJ. On 6th 3. 83 DK5IE EJ, DL9GU EJ, DB3UU in EJ, DL5FAU EK and DB1PM DK (375 km odx). On 7th May 1983 DJ5AP/p EH (156km), On 8th May DB3UU EJ (249km) and DK0NA FK (339km). tks fer info Erich

DB2VY in DJ wkd on 2320 MHz on 27th 3. 1983 DC9KK in DK16c 51 51, on 11th 4. 83 DL4VB/p in DJ55j 59 59, on 24th 4. 83 DL4VB/p in DJ46j 59 59, on 8th 5. 83 DB3UU in EJ34f 57 52, on 22nd 5. 83 DK0NA in FK58b 519 319 and on 23rd 5. 83 DK8SG in EI13j 59 56. Frank used a 1.2m diameter parabol antenna; TX 2C39 abt 4W rf and as frontend a BFR34a. tks fer info Frank.

DJ5AP (EH) schreibt...DK4GD und ich hatten an Ostern unser erstes QSO auf 9cm (SSB) auf eine Entfernung von ca. 15 km. Signale beiderseits 59! Antennen: Gruppen mit 18 1/2 Dipolen vor Reflektorwand. Kurz zur Technik: Beiderseits wurden Konverter nach DC0DA benutzt. Oscillatoraufbereitung bei DK4DG ebenfalls nach DC0DA, bei DJ5AP eigene Entwicklung. Sendeumsetzer jeweils Entwicklung von DJ5AP, bei DK4DG

continued on page 135

TROPO NEWS

2m: > 500 km
70cm: > 300 km

by DL7ACG

2m 2m 2m 2m 2m 2m 2m 2m 2m

DF2ZC EO29h wkd:

23.01.		F1CNT	BJ	G4IGO	YL	GM8OFX	YR	24.01.	
DG7GAY	EH	F6DKW	BI	mni	ZO	GW4RGI	XL	OH1ZAA	KV
DK6TJ	EI	F6DWG	BJ	GW3OKA	YL	DG1MAJ	FH	OH1EL	KV
mni	EI	F6EVT	BI	G8HQA	ZL	mni others		OH1KH	KV
DG6MAG	FI	GW6EUTp	YM	GW6JDK	YL	in: ZN, ZM,		OHØJN	KU
HB9PGQ	EH	G4ACS	YM	GW4EAI	YL	FI, ZL		mni HT,IT,	
G3CHN	YK	G8PXX	YM	GM4BWT	YP				

vy 73 Bernd

DF8AE (EM73e) wkd:

1.12.82		F1DVO	AJ	GW6EUT/P	YM	24.1.83		G5YU	YK
SM7NNJ	IQ	F6CKZ	AJ	G4REZ	XK	SMØDJW	IS	F6FLB	AK
SM1MUO	JR	12.1.83		23.1.83		SM7EML/P	HQ	HB9QQ	EH
SM7DLZ	IQ	OZ1FYW	HP	GM8YPI	YP	SM5MIX	HS	G8LLJ	ZL
31.12.82		OZ1JDU	HP	G8UHU	ZN	SM3COL	IW	G6DOD	ZL
F6FLB	AK	UP2BKH	KP	G8WPD	ZN	18.2.83		G6CMV	YM
G4IBH	AL	UP2BJB	LP	G6KCB	ZN	OZ1CSI	HP	G4PSX	ZL
GU3KFT	YJ	UP2BFR	LP	G8OYL	ZN	8.3.83		G4DXI	AL
F6FTI	AK	22.1.83		G8KZY	ZN	G3DAO	XK		
G4DEZ	AL	G4KUX	ZO						
G6ECM	AL	G4PCI	ZL						

tnx fer info

DG7AT (FM44d) wkd:

22.Ø1.83		G4NYZ	ZM	OE5FPL	GI	SM5EFP	HT	SM1MUU	JH
G8LLJ	ZL	F1AVS	CH	OE5JSL	GI	SM7JL[illegible]T	GQ	SMØMPQ	JT
F1FHI	ZH	F6GYH	C1	GM8OEG	YQ	OZ1HWS	GQ	SMØJEM	IT
F6HVK	CH	EA1NQ	hrd	GM8MBP	YR	SM7LNJ	GP	SM5BOQ	IT
HB9MNV	EH	23.Ø1.83		GM6KXS	YR	SM5NER	IS	SM5MXJ	JU
HB9RBC	DH	G8ZXE	ZL	GM6JUK	YR	SMØKFV	IT	SM5NQM	IS
F1KCP	B1	G6OOW	XL	Gm3XOQ	ZT	SM7OS	IQ	SM7NJF	HP
G4DEZ	AL	G6JJB	Zm	24.Ø1.83		SM4KWZ	HT	SM7LSW	IR
GW6HMT	XL	G6LCM	AL	SM5MGW	HS	SM7NYM	HR	SK7CS	IQ
G4CVI	ZK	G8KBQ	YL	SM3COL	IW	SM7FSR	GP	SMØKFJ	IS
G4PCI	ZL	G4PCI	ZL	SM5MIX	HS	SM7MVR	IQ	SM5CBN	HS
G6HIE	AK	G6CMV	YM	OZ1IWL	EQ	SM4MNN	HT	SM7NUN	IQ
G8MCP	YK	G4DHF	ZM	SMØFMT	IT	SM4DLS	HU	SM6EGX	GQ
F1BZN	YI	G8VLL	AM	SM5MGW	HS	OH1ZAA	KV	SM1MKY	JR
G8MZI	YK	HB9QQ	EH	SMØEPM	IT	SM1MUV	JR	SM7KNK	HP
GW4RWR	YN	G6HOU	XK	SKØLM	IT	OHØJN	KU	SM7MNQ	IQ
GW6EUT	YM	HB9AEN	DG	SM4LLP	HT	OH1KH	KV	OZ1CSI	HP
G6DOD	ZL	GW6PIL	YN	SK6DG	GR	SK6HD	GS	OZ1HTB	HP
F6IBX	XI	G6NTF	YM	OZ8ZT	EP				
G8RZO	AL	GM8OFX	YR	SM4HJ	HT				

tnx fer info

DL7YS (GM46b) wkd:

17.10.		27.10.		OK2KCR/p	IJ	OK1KP/p	HI	OK1KKW/p	IJ
HB9QQ	EH	PA3APH	CL	6.11.		7.11.		1.12.	
18.10.		OE3NDA	II	PAØMB/p	CL	OK2KQQ/p	JJ	SM7DLC	IQ
OE3NDA	II	OK2BFH	JJ	DKØOX	EI	OK2SGY/p	IJ	OK2BPR	JJ

5.12. From 1400 to 1700 I had good pictures on channel 3 in TV-Band 1, at 1545 heard 89+ Italian stations for abt 30 sec on 144,300! MS or ES or Tropo?

31.12.		HB9QQ	EH	G3ERA	YP	8.3.		GGDLR	AL
ON6UG	BL	DF3TT/p	EI	GM8OEG	YQ	G4DCV	AL	GGOUS	AL
OE3LFA	II	DC2GY/p	EI	GM8MSP	YR	G4PSX	ZL	PGKFH	DJ
DL4NAA	EJ	GW4GSS	YN	G4CDC	ZN	GGHKM	AL		
29.1.		G8UCN	ZN						
HE9POM/p	EG	F6EKJ/p	CH						

tnx for info, Peter

F1FHI (ZH63d) wkd > 900 km:

30.12.		OK1GW	HK	OK1KRQ	GJ	Y25DH	FL	OK2KZR	IJ
PAØOOM	DN	Y22NE	HM	Y22ZM	GL	Y24DK	FK	Y24TJ	FK
PAØOOS	DN	Y23KK	FK	Y24IN	FL	Y24XG	FL	OZ9PW	EQ
21.1.		OK1AGI	HK	Y25CM	GL	OZ1DOQ	GP	Y21IL	GL
GI8TVK	WO	Y76ZL	HL	Y24FD	GM	Y25GJ	FL	OZ5GN	EQ
GI4GUS	XO	OK1VMK	GK	Y23GM	GL	Y21SF	GL	OZ1DLD	EP
GI6DCQ	XO	OK1ATQ	HK	Y24XI	FL	OZ1FDJ	GP	SM7MKT	GP
GD3AHY	XO	Y24KJ	GK	Y23SJ	FK	Y30EFE	GM	OZ1HXM	EP
GD4GNH	XO	Y23KN	GM	Y30ASI	FK	Y23BD	GM	OZ3NH	EQ
GB3SUT	bcn	OE3OEC	II	Y25HV	GM	Y25VN	GK	OZ1OF	EQ
22.1.		OK1VEM	HK	Y26XH	FN	OK1KSL	HK	OZ9SL	FP
Y23EG	FM	OK1FM	GJ	Y22EG	FL	OK1QI	IK	23.1.	
DC7KM	GM	DL6NAA	FK	Y25HN	GK	OK1AIY	HK	LACHL	CS
Y25LN	GK	OK1VKV	HK						
Y24XN	GK	OK1VLA	HK						
OK1MBS	HK	Y22EN	GK						

tnx fer info

G3PBV (YK32b) wkd:

22.1.		DG5CH	GI	23.1.		LA7RU	CS	LA8AK	DG
OK1FH	GJ	4U1ITU	hrd	OE3LFA	II				
DL3MBG	GI								

tnx fer info, Dave

G8LFB (ZL3Øf) wkd:

8.3.		DL1MBV	FI	DL6XZ/p	GI	DB2RR	FJ
HB9QQ	EH	OE2AOM/2	GH	Y23ED	GM		

tnx fer info, Jim

UA1ZCL (RCØ8) wkd:

29.11.		SM6CMU		22.12.					
SM4IVE	HT	OH1DP		LA8SJ		SMØDCX	IT	SK4MPI	
SM5CNQ	HS	SM6AFH	GQ	LA8SJ		SM5CNQ	HS	SM5MIX	
SM3AKW		LA6QBA	FT	SM5MIX	HS				

tnx fer info

G8CAH/p and G8ROU/p (ZN62d) wkd:

22.1.		HB9RKS/p	EH	F1BBS	DI	HE9EDI/p	DH	DK8ZB	EJ
HB9RCJ	DH	DG3CC	FI	DFØSJ	EI	DD1SR	EI	DF1CF	FH
FC1EO	BG	HB9MDO	DG	Y21SF	GL	DL1MAX	FI	DB3VE	DJ
DD7JT/p	DK	OK1EKU	II	Y25JE	HM	F1GUX	BI	DH2DAE	DL
F8OP	CG	OK1VKV	HK	DD5IA	EI	HB9MIV	EH	DF6UO	DI
DIØWW	EJ	OK1HAG	HJ	HB9CHG	EH	DC7OH	GM	OE5OLL	GI
FC1DQX	CF	HB9MMM	DH	OE5FPL	GI	DJ8QQ	EN	I2FHW	EE
DL5MCG	FI	HB9RO	DG	DB3RT	GI	OK1MBS	HK	DG1IG/A	EI
DF8VK	DJ	LX2EG	CJ	OE3PQU	HI	Y25ME	HM	HB9IN	EH
DL3GAA	DH	F1FLU	ZE	Y24XI	FL	DK5MY	FH	F6EZA	DH
DC3YG	FJ	DL9NEM	FJ	Y24QO	GM	DL5MCO	FI	F1GIM	CG
F1EA	DI	DK2WP	EI	DA2GD	DH	DJ8QP	GH	DG9SH	EI
F1FLU	ZE	F6EQG	DI	F6FET	DI	DH1IAB	EJ	DF5AI	FM
F1BBZ	DI	DG8GAB	EI	DF1CF	FH	OE9IM	EH	DD3OE	FM
Y23KR/A	GM	DG6GAE/p	EI	DK1VI	EJ	DD3RV	FJ	Y23BD	GM
DF1OK	FM	DL4GN	EI	OE5VHL	GI	DL4NC	FJ	DG9KBE	DK
Y24BO	GM	DF5TC	EI	DJ7QI	CJ	DH1IAD	EJ	HB9ABN	EH
OK1DKX	HI	OK1KSL	HK	DK8FS	EK				

G8ROU (ZN62d) wkd:

23.1.		OE3LFA	II	DH8SAA	EI	LA7RU	CS	DB1EA	DL
DG2GY/p	EI	1251 km		DB2RF	FJ	LA6HL	CS		
DC8AG/A	DL								

tnx fer info, David

PE1AAP (CM67a) wkd:

2.11.	OZ5TG	EP	OZ1QZ	EP

tnx fer info

SM7LXV (GP48a) wkd:

1.12.		OH3MF	MU	DG2GY/p	EI	OK1KFB/p	HJ	Y44XJ	FK
DIØUD	DL	OHØAZX	JU	DL1RAN	FJ	23.1.		Y3ØBVM	GL
Y79YL	HK	OH3AXN	LV	DL5MCG	FI	HB9AMH/p	DH	18.2.	
2.12.		Y46XF	HL	OK1KRQ/p	GJ	Y25LN	GK	PE1AGJ	DK
SM3LBN	IU	OK1MDK/p	HJ	OK1DIG	HK	OK1KKH/p	HJ	DL2KAI/A	DK
LA7KK	FJ	OK1KRA	HK	OK1KRA	HK	Y24IH	FL	3.4.	
3.12.		UP2BJB	LP	OK1VYL	HJ	Y21SF	GL	OK1FM	GK
OH5IY	NU	12.1.		OK1VLA	HK				
OH3AZB	LU	DK8SG	EI						

tnx fer info, Christer

UA3LBO (QO21h) wkd:

27.11.		UK5VAS	PI	UK6LDZ	TH	UY5RG	RI	UA1WDX	OR
UK5EDT	RI	RB5IOJ	SH	UB5LAK	SK	5.12.		UQ2AO	MQ
UB5JIW	RF	UA6LGH	TH	UB5LGC	SJ	UR2DL	NS	UA1WW	OR
UB5VEP	RI	UA6YAF	TE	RB5LKW	SJ	UP2PU	LO	UP2PBT	LO
RB5EHB	RI	UB5IRI	TH	UB5QDM	RH				
UB5HCU	RJ	UK5IEC	TI	RB5ILT	SH				

tnx fer info

UA3TCF (WQ14a) wkd:

28.11.	RB5LAA	SJ	UA3PBY	SN	UK5EDT	RI	UB5LAK	SJ

tnx fer info

UA3MBJ (SS78e) wkd > 800 km:

23.11.	UB5EHP RI	SM6LJP GS	UC2AAB NN	10.12.
UA1ZCL RC	UY5RG RI	5.12.	RC2WCG OP	OH5LK NU
28.11.	3.12.	UC2ABN NN	UC2ACA NN	
UK5EDT RI	SK6HD GS			
UK5EFC RI	SM6NQE GR			

tnx fer info, Nick

UB5JIN (REØ1f) wkd:

10.11.	UB5YM MI	23.11.	25.11.	27.11.
UB5VEP	UB5YCU NI	UB5EDS RI	UK5EDT RI	RA3LBK QP
UB5CAF PI	UB5BAE MJ	UB5QCC RH	UA3QIN TL	UA3IDQ QQ
UB5LIQ RJ		UK5IEC TI		
UB5ICR SH				

tnx fer info, Wasil

70cm 70cm 70cm 70cm 70cm 70cm 70cm

DB6BX (DM46c) wkd:

4.12.	23.1.	G4IOQ YM	OZ8WK ER	LA7BI ES
OE2CAL GH	OE3LFA II	G4PEC ZP	LA2SN ES	OZ1FER GP
22.1.	OKOEA bcn	G4MDZ AL	LA7IB FT	SM7LXC GP
F1KBF BI	G6CGY ZO	LA3UHF bcn		
EA1NU XD	DL7HR FI			

tnx fer info, Peter

DF6HT (FN31g) wkd:

21.10.82	30.10.82	221.83	24.1.83	18.2.83
OK6WW GK	F6GKT BI	G4FRE AL	LA8AK DS	G4NBS ZL
	F1EBN BI	23.1.83	SM3COL IW	G4DCV AL
30.10.82	G3IDG AL	G6ADE ZN	Y31QM/a GL	G3LTF AL
DG1NZ FJ	G4LOJ AM	G4KUX ZO	SMØFMT IT	6.3.83
F6GNR ZH	DK8MF/a GI	G3UVR YN	SM3AKW JW	SM7CFE HQ
F1FYE AI	DK9MN FI	G6CGY ZO	OHØNC KU	
F6APE BI	DB2RR FJ	LA7IB FT	OHØFU LU	
F1FHI ZH	G8TFI YL		18.2.83	
F6GCJ AG	31.10.82		PE1GXU CL	
	SMØDJW IS		G2CIW AL	tnx fer info
	R[illegible]GAG MQ heard		ON4ZN CL	

G3PBV (YK32b) wkd:

30.12.	F6BZA AG	F1SA CI	23.1.	LA8AK DS
F1EZQ CH	22.1.	DL2GBT EI	OE3LFA II	LA2SN hrd
11.1.	HB9AEN/p DG	DF1EQ DL	DB1BP DN	
F1BUU ZE	DK2GR FJ			

tnx fer info, Dave

UA3MBJ (SS78e) wkd > 800 km:

29.10.	UC2ACA NN	UC2ABN NN	5.12.	UC2AAB NN
OH5LR NU	UC2AAB NN	UA1ASA NN		

tnx fer info, Nick

OH1EHI (KP30) wkd > 1000 km:

31.12.		22.1.		Y24XN	GK	DC4XH	EI	DKØVN	FO
DK2GR	FJ	DL9RBK	GJ	Y22EN	GK	OZ9SL	FP	DG4LE	EO
DJ9HO	FK	Y23FG	FM	OK1GW	HK	OZ7LX	FP	DL3UC	FN
DG1HZ	FJ	DL7APV	GM	DB4LT	EO	OZ9FW	GP	10.3.	
DH4HAC	FK	DL4OL	FH	DL7YC	GM	DF3IY	FO	GI4SAN	XO
		Y23JK	FK	Y24EO	GM	DL2CI	FO	GI8NBW	WP

23.1. 200 stations from UA,AK,AL,AM,YK,YL,YM,YN,YO,ZK,ZL,ZM,ZN,ZO,XK,XI,XN,XO

tnx fer info, Jan

G8GAU/p and G8KOU/p (ZL62d) wkd:

23.1.		OE3LFA	II	HB9MIN/p	DH	PEØEMC	CL	DL2KBB	DK
OE1CAM/5	GJ	PAØFRE	CL	DG1NZ	FJ	18.2.		PAØFRE	CL
DL2KFB	DK	DL7QY	FJ	DF7VX	EL	DG1DJ	DL	DD3KF	DK
Y22EN	GK	DK1KH	DK						
DF3EM	DL	OE3OEC	II						
HB9AMH/p	DH	1255 km							

tnx fer info, David

OHØNC (KU71g) wkd > 500 km:

2.12.		OZ3ZW	FO	Y22NE	HM	Y22ME	HM	OZ3ZW	FO
OZ7LX	FP	LA8AK	DS	Y21KI	GL	DK2AR	EM	DF1OH	EM
UP2BJB	LP	3.12.		24.1.		DJ7YP	EM	DK6AS	FM
OZ3GW	FQ	UC2AAB	NN	DF7VX	FL	DK3UC	FN	3.2.	
OZ1ABE	GP	UP2CH	LP	DL7APV	GM	DF3AR	FM	OZ7IS	GP
LA9DL	FT	UP2BFR	LP	DF6HT	FN				
OZ9FW	GP	UP2PU	LO	DK7LW	FO				

tnx fer info, Sam

PA3BGL (CN72a) wkd:

14.12.		DK2LM/p	EJ	F6GCT	BI	DK9MN	FI	HB9AEN/p	DG
DG1NZ	FJ	DD4GK	EI	18.2.		DL7QY	FJ	24.4.	
31.12.		OE3LFA	II	DK6AQ	FL	DL9FW	FJ	G4FEC	ZP
F6DKW	BI	24.1.		8.3.		20.3.			
23.1.		F1YJ	BH	DB2VY	DJ	F1FDB	DI		
DF8IX	EJ	F6BZA	AG						

tnx fer info, Albert

PE1AAP (CM67d) wkd:

9.11. G8ZHP ZM

tnx fer info, Dolf

UA3LBO (QO21h) wkd > 1000 km:

27.11.		UB5ILT	RH	OZ7IS	GP	Y22HA	GO	OZ1HDB	ER
UB5JIW	RF	UA3QEG	TI	OZ9QV	GP	DF3LY	FO	DF5LQ	EO
28.11.		3.12.		OZ7LX	FP	OZ2OE	EP	OZ9FW	GP
UK5EDT	RI	SM7HQD	IR	OZ1ABE	GP				

tnx fer info

UA3TCF (WQ14a) wkd:

28.11. UA3PBY SN UA3QHS TL UK5EDT RI UA3QIN TL

tnx fer info

METEOR SCATTER NEWS

by D F 2 Z C
Bernd Mischlewski
PO Box 16 12
239o Flensburg

MS-Lists

Fortunately I could catch again 25 MS-Lists of those printed in 1981.
If anyone is interested in one MS-List, so please send me 3 IRCs for each list plus 1 IRC for mailing.(Address as above) DF2ZC

Supplements/Corrections to the MS-List

G8RWG	ZL	N.Montanana;324 Yorktown Rd.;College Town;Camberley; Surrey;GU15 4P2 (ø276-32195) SSB only
Y22HA	GO	D.Boelte (1/82 page 23: name was wrong)
DL2OM	DK	R.Milker;Am Wäldchen 16;5411 Eitelborn (ø262ø-8516)
G8ROU	ZN	D.Hardy;Thorntree House;Wensley;Matlock;Derbyshire; DE4 2LL (ø62983-262ø)
DH1LAC	FO	C.Esch;Dorfstr. 7;PO Box 2;23ø4 Laboe (o4343-8o12)
SM5MIX	HS	U.Gustavsson;Dalgardsgatan 9C;59ø1ø Boxholm (14251747)

Sending your MS-Infos to DL7QY or directly to me?

In the past it happened several times that I received the letter from DL7QY, containing the MS-Infos that were sent to him, very late before the deadlines of the DUBUS-Info referred to. I don't know the reasons about this. But therefore the infos often had to be typed in a great hurry or even for some of them the typing could not be finished in time.
Though it is of course easier and cheaper to send all your infos (TROPO,Aurora,E_s,MS,MB,..) to Claus I ask you to send your MS-Informations directly to my address (see above), if you want to be sure they'll be typed in time.
Another advantage for me is then that the typing can be distributed on abt 2 months and not only 3 weeks or even less.
(If you type your infos on a machine please keep a space of 17o mm x 24o mm; I then do not have to type it again.)

thank you DF2ZC

In perseids DF2ZC will be working from EO square with 1 kW HF, 16o el coll. RANDOM on 144.1oo+144.145 1 min CW+ 144.2oo+ .4oo nearly only. Max speed CW (tx+rx) abt 13oo LPM. On SSB breaks will be made all 1o to 15 seconds. 73's Bernd

28.5.1983

REMEMBER RANDOM 144.145 MHz CW at 1 min periods
144.4oo MHz alternative SSB

Derbyshire Hills Contest Group

Wales 1983 Expedition 6 — 20 August

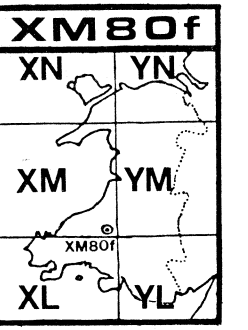
DAVID HARDY,
Thorntree House,
Wensley,
Matlock,
Derbyshire DE4 2LL
ENGLAND
TEL. 062983 2620

PRELIMINARY INFORMATION - 30th March 1983

Members of the Derbyshire Hills Contest Group shall be operating from QTH Locator XM80f during the Persieds meteor shower in 1983. This will be the second year that we have used this site, our expedition in 1982 suffering from very strong winds which wanted to point the antenna in any direction but that necessary for the skeds! We also chose the most rainy week in the whole summer which at times obliterated weak signals with 59 rain static. We made successful SSB skeds with DF6QB, SM6ECC, OE5EFM (90 second burst - 49 !), SM7KNK, I3ZBC, YU3BV, YU2CCB and SM6FKF. To all the stations with whom we had skeds but failed to work our apologies and perhaps we shall have better luck this year.

EQUIPMENT TS700G + 2 x 4CX250B Linear - 400w pep

ANTENNAS 2 x 17 element Tonna at 10m



Operation will be on SSB only unless equipment and operators are available for CW operation.

Operating frequency - 144.440MHz

If possible a station will be in operation on the VHF Net on 14.345 MHz but this will only be possible if operators are available.

Callsigns of stations are still to be confirmed for CW and VHF net operation if this takes place. 144MHz SSB Callsign - G.6APZ/P

If a station is available for the VHF net then skeds may be made during the expedition but to be certain of a sked please contact me at the address below.

73s and good DX

David

DAVID HARDY, G8RCU

I shall also be looking for SSB skeds for myself during the GEMINIDS and QUADRANTIDS in the winter. (ZN62d)

****
DAVID HARDY, G8RCU,
Thorntree House,
Wensley,
Matlock,
Derbyshire,
DE4 2LL.
ENGLAND
****

Continued from page 128 :

HF/out: 15 mW; bei mir 30 mW. Inzwischen wurden von mir 2 kleine Linearverstaerker entwickelt (volltransistor mit BFR34a und BFR96) HF out gemessen = 250 mW! Wenn zum Kontest die Roehren - PA mit der YD1060 noch fertig wird bin ich am Wochenende beim Kontest mit 2-4 W auf 9cm qrv, sonst mit den 250 mW. Antenne: Spiegel mit 70 cm Durchmesser. tks fer info Gerhard

PA3BIY CM72c wkd:

1o.o4.	o4oo-o6oo	LA5IH	CU	26	27	6	8	NC
23.o4.	o2oo-o245	YU7AJH	JG	27	26	11	16	C 2s
4.o5.	o2oo-o4oo	UA3DHC	TQ	26	26?			
5.o5.	o6oo-o7oo	UO5OGF	OG	26	--	double sked NC		
6.o5.	o3oo-o5oo	EA1QJ	VD	27	26	3o	95	C 1,5s
8.o5.	o4oo-	SM2GHI	MZ	27	26	25	52	C 1,5s
9.o5.	o2oo-o3oo	UA3LAW	PO	26	27	27	35	C 6s
	o4oo-o425	HG1W	IH	28	26	26	46	C 14s
	o6oo-o7oo	SK2NR/2	HA	26	26	11	16	C 1s
11.o5.	o3oo-o4oo	I6DQE	GD	27	27	26	56	C 1,5s
12.o5.	o3oo-o45o	I1KTC	EF	27	26	4o	93	C 8s
2o.o5.	o5oo-o65o	G4IJE	AL	26	26	14	39	C backscatter
6.o6.	o4oo-o45o	SM2BAI	LZ	26	27	23	3c	C 7s
8.o6.	o455-o545	LA1K	FX	27	26	34	47	C 2,5s RANDOM
9.o6.	o5oo-o6oo	I8REK	HA	26	--			NC
18.o6.	o3oo-o435	FØJL	DD	27	25	35	63	C 2,5s
27.o6.	o2oo-o4oo	FØJL	DE	26	26	7	12	NC 4s
	o4oo-o545	LA8KV	FW	26	26	16	48	C 2,5s
11.o7.	o4oo-o545	UQ2GLO	KQ	26	27	2o	48	C 8s
12.o7.	o5oo-o6oo	SM3GHB	HW	26	27?	5	15	NC 3s
14.o7.	o4oo-o53o	YU2CBM	ID	27	26	11	44	C weak
15.o7.	o6oo-o7oo	IW3QBC	GG	27	27	15	3o	C 2os
28.o7.	o125-o225	YO7VS	LE	26	39	12	49	C 8s
29.o7.	o235-o34o	UC2ACA	NN	27	37	no calls NC		
3o.o7.	o2oo-o245	YU7EW	KE	27	27	m n i		C 1os RANDOM
31.o7.	o125-o2oo	OK3CGX	II	28	37	m n i		C 4s RANDOM
	o2oo-o4oo	LZ1KPG	LC	37	--	m n i		NC 14s rcvd no rprt
1.o8.	o6oo-o7oo	I7CVC	HB	27	--	2	6	NC
12.o8.	o2oo-o225	F6FTN	DC	36	27	5	6	C 13s
	o5oo-o6oo	SM3GHB	HW	26	26			NC 6s
	1o55-12oo	LA6CU	CU	26	26			NC vy short
	12oo-1225	EIØRTS	UN	47	26	4	15	C 2os
	16oo-17oo	OK3KCM	JI	37	27	8	1	NC
	18oo-192o	G4OAE/OHØ	KT	26	26	37	46	C 11s
	2ooo-22oo	SM2EKM	KZ	26	--			NC vy weak
14.o8.	o1oo-o25o	YU6VHF	JB	37	26	54	1oo	C 7s
	22oo-24oo	YO5BIN	LH	26	--	2	2	NC
15.o8.	oooo-oo4o	OK5PAI	JI	27	27	1o	22	C
12.o9.	o445-o615	YU1OO	KC	27	26	9	2o	C 1os weak
23.1o.	o612-o73o	F6DRO	AD	27	27	17	66	C 2s sri 2 min late

NIL:EA6AU,UO5OGF,UK3AAC,HG6NQ,YO7VS,SM2EKM,RQ2GCS,LA6HL/TF, I4MKN,EA7CFW,YO2AFS/4,RA3AGS,UK2CAU,IW5AVM,OK2PVB,HG6KVB, OH4UC,YU2JL.

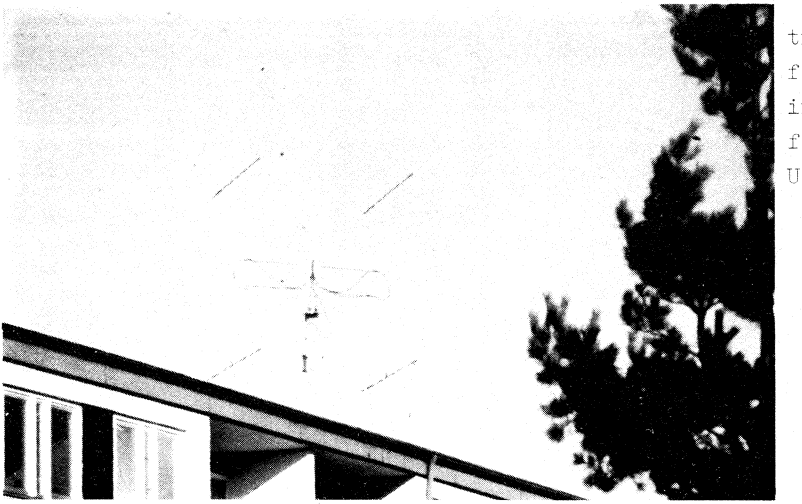
tnx fer info, Peter

Ulf, SM5MIX, writes about his plans for perseids:

During Perseids,Geminids 82 and Quatrantids 83 it was usually a high activity on RANDOM, both on CW 144.1oo and SSB 144.2oo+ 144.4oo. The problem is that everybody works on the same QRG; for the weaker stations it is very difficult to work because there are too many stronger ones. For Perseids 1983 I plan a test at IARU-Reg 1-Proposal:
The night between 12 and 13 August from 23oo GMT to o6oo GMT →

in the morning of 13th August I will be QRV on SSB QRG 144,224 and call CQ there. I always send in the second pass; e.g. 23o1-23o3-23o5 and so on, 1 min periods at breaks all 15 sec.

If nothing happens to me or my rig I will be there 1oo % sure. RIG: IC73o+Transverter+Preamp 3SK97+4x7 el Quads.



tnx fer info and foto, Ulf

UA3TCF (WQ14a) wkd MS:

24.10.82	0200-0400	UB5BAE	MJ	27	-	1b	2p	NC
	0400-0600	OZ1DOQ	GP	-	-	-	-	NIL
8.11.	0300-0500	UB5BAE	MJ	27	27	7	6	NC
11.12.	0300-0500	UB5BDC	MJ	-	-	-	-	NIL
	2000-2040	UB5GBY	QG	27	26	5	4	C
	2110-2140	UB5GDV	QG	26	27	11	-	C
	2200-2400	LA6QBA	GV	-	-	-	-	NIL
12.12.	1430-1615	UB5BDC	MJ	-	-	-	-	NIL
	1800-2000	UA6HAR	ME	27	-	1	3	NC
	2000-2125	UA6BAC	SE	27	27	21	43	C
	2200-2400	Y22HA	GO	26	-	1	3	NC
13.12.	0000-0100	UA9XAN	AX	27	29	2	-	NC
	1500-1620	UA9SEN	BL	27	27	28	74	C
	2000-2125	UK6HAR	ME	37	47	21	46	C
	2200-2400	DK1KO	FN	-	-	-	-	NIL
	2310-2337	RB5IOJ	SH	36	37	C	-	C random
	2337-2355	RO5OAA		37	37	mni	mni	C random

HRD RANDOM: UK6LDZ, UA6YAF, UB5CBY, UA4CDT.

tnx fer info

QK1MBS HK48a wkd:
3.o1. EI2CA WM 26 26 7p 3b C 1,5s tnx fer info

ÅLAND ISLANDS

1982 BRITISH EXPEDITION

G4IWA/OHØ ☐

G4JVG/OHØ ☐

G4OAE/OHØ ☐

G8SYE/OHØ ☐

OPERATORS: JOHN ARROWSMITH G4IWA,
STEVE LOWE G4JVG, DAVE CRISP G4OAE,
NICK TROTMAN G8SYE and SWL NIGEL COOPER.

QTH LOCATOR
KTØ5e

Dave, G4OAE reports about their OHØ-Expedition:

On the expedition there were 5 people; 4 amateurs and a friend who is an SWL and kindly acted as chief cook for most of the time. It took us 2½ days to get from our homes in England to our island (Kökar island), by travelling on 3 car ferries and driving right across Sweden from Gothemburg to Stockholm throughout one night.

On arriving at our rented summerhouse (Stuga) we started putting together some of the gear so that we could start operating as soon as posible. Initally we put together just one of our 15 element yagis and was almost imediately rewarded by hearing G3VYF calling CQ MS on the calling frequency. The fantastic thing was that the antenna was only a few inches off the ground as it was being supported by a couple of garden chairs, and not even accurately pointing at Engalnd. The following day when all the gear had been set up, we started operating properly.

Most of the operating was done on CW at about 800 lpm and many of the QSO's were scheds. However a lot of stations were worked either via sheds made on the VHF net just prior to the QSO or by stations tailending their friends, which helped nicely to fill in all the gaps and free time that we had.

Our gear was:-

FT225 RD with Mutek Front End Board.

Linear with 2 x 4CX250B's in Push Pull.

4 memory CMOS Keyer with LA8AK Tone Keyer.

LA8AK audio Up-converter prior to the recorder.

Philips N2234 cassette tape recorder.

and finally the antenna system which was very kindly loaned by Cue Dee of Sweden. They let us have 2 x 15 element yagis and all the supporting hardwear, coaxial cable and combiner unit. Due to the lack of activity in our local area we were not able to carry out any tests on these antennas, but judging by our results on MS they were obviously working very well indeed.

We had many noteable QSO'S but one that was especially interesting was one with PAØCOM, who on his QSL card said:-

"Most spectacular QSO I ever made! During our sched, there was a good Es opening to Spain. Using the main station for MS., there was a 10 watt station with a 10 element yagi left. EA6AU was calling CQ, and taking the risk that we could miss a burst, we called him; he answered and we gave his report etc. When we released the microphone button we received at the same time the confirmation from EA6AU and a 12 second burst containing all the info from you!"

Best 73's

Dave

Remember to use 144.400(SSB RANDOM)and 144.125(CW RANDOM at one minute periods);especially in perseids!!!!

Please keep your infos if typed on a machine within a space of 17 cm x 24 cm! Mni tnx!

OK2SGY wkd MS:

12.XII.82	00 - 02	F5DE	AF	2b	-	3b	13p	NC	
	06 - 08	F6KCP	BI	2b	-	3b	8p	NC	
	22 - 24	GM3ZXE	YQ	- only pings					
13.XII.82	00 - 02	GM4IPK	YP	27	26	4b	21p	C	5sec
	21 - 22	GI4GVS	XC	27	36	4b	10p	C	
	23 - 24	F5DE	AF	26	27			C	QRM
14.XII.82	04 - 05	OH5IY	NU	27	37	5b	12p	C	5sec

NIL : CH3AWH , I1JTQ , LA1K , LXAU , LA6QBA.

3.1.83	05 - 06	F1JG	CD	only pings					
	09 - 10	F6FOE	YI	27	-	3b	5p	NC	4sec
	13 - 14	OH3TR	LV	38	-	2b	13p	NC	10sec
	20 - 21	SM4KWZ	HT	38	27	7b	33p	C	10sec S9+
4.1.83	00 - 01	F1JG	CD	sri no el power					

NIL : UK3AAC , CH3AWH , SM5CBN , CZ1HNE , F6FEN , EA6JB , LA1K

I should like to say something abt QSL morals. When I started my work via MS I hoped the QSL moral should be good. But now I must say, qsl moral is normal, abt 50 %.
One MS contact is abt 2 hours long and to write down one qsl abt 10 seconds only.
I am expected more one year to qsl card from SM5CUI, SM0FSK/3, SM0EJY, G4IJE, G3NOM, SM7DLZ, UA3QHS, G4ASR etc.
I had sent them qsl direct mostly with SASE + IRC but no answers.
Every ham must know, final of contact is QSL , I think.
I prepare my work from my fortable qth IJ18D wite during Arietids and Perseids 83 and I'll invite all proposal to by MS qso.

Vy 73 dx

Pavel Chmelař OK2SGY
Jana Svermy 35
75701 Valašské Meziříčí
Czechoslovakia

OK2SGY tnx fer info

Y23FG FM69g wkd:

13.11.	o6oo-o8oo	OH3MF	MU	26	26?	6b	6p	NC	
	18oo-2ooo	YU7AU	KE	26	--	1	1	NC	
6.12.	2ooo-22oo	YU7AU	KE	26	26	5	6	C	
9.12.	23oo-oo45	I1DMP	DF	26	26	7	7	C	3,5s
1o.12.	13oo-15oo	OH3MF	MU	26	26	4	1	NC	
	18oo-19oo	OH3MF	MU	26	26	7	13	C	1s
	2ooo-22oo	YU7MBT	JF	26	--	1		NC	1 kc down
11.12.	o7oo-o8o5	SM3JGG	HV	26	26	6	4	C	
	18oo-184o	LA6QBA	GV	26	27	7	8	C	3,5s
12.12.	o4oo-o5oo	IW5ACZ	FD	26	27	9	18	C	1os SSB
13.12.	o4oo-o6oo	UA1ZCL	RC	26	--	1	3	NC	stop o5o5,QRM!
	18oo-19oo	F1EIT	BG	36	26	14	13	C	1os+12s+15s SSB
	19oo-21oo	YU7QCA	JF	26	--	6		NC	vy short
14.12.	oooo-oo35	YU7MAU	JF	26	26	7		C	1os+3os
	o1oo-o2oo	GI4OPH	XO	26	26	9	4	NC	vy weak SSB
	o4oo-o415	IW2BNA	EF	26	26	12	9	C	5s SSB
	19oo-2ooo	YU7AJH	JF	27	26	8	6	NC	
22.12.	16oo-18oo	YU1AWW	KE	27	--	3		NC	QRN rain
2.o1.	18oo-2ooo	UA3DHC	TQ	--	--		2	NC	
	2ooo-22oo	YU1ADN	KD	36	26	3	4	NC	8s
	22oo-24oo	YU1AWW	KE	27	--	2	2	NC	
3.o1.	o5oo-o7oo	YO3JJ	NE	26	--	1	2	NC	
	o9oo-1ooo	I4YNO	FE	26	--	3		NC	SSB
	18oo-2ooo	YO3JJ	NE	27	--	2		NC	2s
	23oo-24oo	YU3ULM	GF	37	36	3	3	NC	7s
4.o1.	oooo-o2oo	YU3TSB	HF	27	--	6	7	NC	YU7AU on QRG
	o2oo-o3oo	IW3AHX	GE	26	26	1o	14	C	SSB
	o3oo-o4oo	YU1ICD	JE	26	26	16	7	C	SSB
	o5oo-o6oo	F1GTR	ZG	--	--		1	NC	
	16oo-18oo	SM3JAW	JX	26	26	11	14	C	
18.o1.	2ooo-22oo	YU3FM	HG	27	--	2		NC	
7.o2.	2ooo-22oo	RB5LGX	RK	26	--	4	4	NC	radar QRN

Hrd RANDOM:12.12.:F1JG CD,14.12.:YU3ZV HG,F6FHP AE
3.o1.: 22o3 CQ UY5HF,4.o1.: o4o2 CQ UA6LGH,
o45o CQ LA1K
o452 CQ I4BXN

NIL:F1FVP,I4GOC,F1ANY,I1BEP,I3YXQ,YU3TSB,EA1TA,I5WHC,I4GOC,
YU7QED,YU3TAK

dk fer info lbr Rolf

UB5JIN RE∅1f wkd:

(all 1982)

14.o4.	193o-213o	UQ2GCG	LR	27	27	5	12	C	
21.o4.	2ooo-215o	UB5BAE	MJ	27	27	6	8	C	
23.o4.	oooo-o1oo	OK2BTI/p	IK	26	26	9	9	C	
4.o6.	19oo-21oo	OK1ACF	HK	26	26	3	7	NC	
7.o6.	oooo-o12o	UQ2GLO	KQ	27	26	7	18	C	
1.o8.	o4oo-o455	HG8ET	KG	27	27	8	14	C	
5.o8.	19oo-21oo	SM4IVE	HS	26	--	2	2	NC	QRM
12.o8.	oooo-o2oo	I1ANP	EE	26	26	3	2	NC	QRM
	o2oo-o235	OK2VIB/p	KJ	27	37	11	7	C	6s
19.11.	2ooo-2o55	UC2ACA	NO	26	27	6	18	C	

tnx fer info
Wasil

UO5OGT OG19b wkd:

9.o8.	oooo-o2oo	PAØHWM	CK	27	--	1b	1p	NC	
	o7oo-o9oo	DF5DE	EK	26	26	3	5	NC	
	12oo-124o	UA3MBJ	SR	26	26	7	2	NC	
	13oo-14oo	UA3TCF	WQ	27	--	1	1	NC	
	19oo-2ooo	I1JTQ	DF	26	26	3	3	NC	
	15oo-1645	UC2ACA	NN	27	26	6	3	C	
	2ooo-21oo	SM3UL	IV	--	--	1	2	NC	
	21co-22oo	UR2RGM	MT	27	--	3	2	NC	
	22oo-24oo	PAØHIP	CL	--	--	1		NC	
1o.o8.	oooo-o2oo	OZ1BEF	EQ	--	--	1		NC	SSB
	o2oo-o3o5	PAØOOM	CM	26	26	5	6	C	
	o3o5-o4oo	SM6EOC	GQ	26	26	4	2	C	
	o4oo-o5oo	SM1BSA	JR	26	--	4		NC	
	o8oo-1ooo	UB5IEP	TI	26	--	1		NC	
	18oo-19oo	OH7RJ	NW	26	--	4	2	NC	
	19oo-2ooo	UA4CDT		27	27	7	3	C	
	2ooo-21oo	HB9QQ	EF	27	26	3		NC	
	21oo-22oo	OZ1FTU	GP	26	--	1	1	NC	
	22oo-23oo	I1KTC/4	EE	26	--	2	1	NC	
11.o8.	oooo-o2oo	PAØHWM	CK	--	--		1	NC	
	o2oo-o3oo	OZ1BEF	EQ	27	--	1		NC	SSB
	o5oo-o6oo	ON6UG	BL	--	--	1	4	NC	
	o6oo-o7oo	UR2RGM	MT	27	--	4	2	NC	
	o7oo-o8oo	IW9AJZ	GY	26	27	6	7	C	
	o8oo-o9oo	IW3ESW	FF	28	--	3	2	NC	
	1ooo-11oo	UK9CAM	CQ	26	--	1	4	NC	
	11oo-12oo	IW5AVM	FC	26	26	3	5	C	SSB
	13oo-14oo	I2AV	EF	27	26	6	2	C	
	18oo-19oo	DL8GP	DJ	27	--	1	1	NC	
	19oo-2ooo	SM5KJO	JW	26	--	1		NC	
	2ooo-21oo	G4ASR	YM	--	--		4	NC	
	21oo-22oo	DL2LAH	HO	26	--	1		NC	SSB
12.o8.	oooo-o1oo	PE1HTE	CL	29	--	3		NC	
	o1oo-o2oo	RC2WBR	NP	--	--		1	NC	
	o2oo-o3oo	ON7EH	CK	26	--	2	2	NC	
	o3oo-o5oo	OZ2GZ	FP	27	--	1		NC	
	o6oo-o7oo	UK9CAM	EQ	--	--		8	NC	
	12oo-13oo	F6FHP	AE	26	--	3	1	NC	
	13oo-14oo	F6DCD	DI	25	--	1		NC	
	16oo-17oo	F6CTW	BI	--	--	1		NC	
	2ooo-21oo	G4IJE	AL	--	--	1	3	NC	
	21oo-22oo	SM2CKR	KX	26	--	1		NC	
	22oo-23oo	G3POI	AL	26	--	2	6	NC	
	23oo-24oo	UL7GBD		--	--		1	NC	
13.o8.	o2oo-o4oo	PE1HTE	CL	26	--	4	2	NC	
	o6oo-o8oo	UA9GL		--	--	1	2	NC	
	o8oo-1ooo	UK9CAM	EQ	--	--		6	NC	
	1ooo-12oo	I1KTC/4	EE	27	--	7		NC	
	13oo-14oc	UK2RDX	MT	26	26	7	11	C	
	14oo-16oo	OE3PUW		26	--	3	3	NC	
	17oo-18oo	OK2VIL	KJ	26	--	3		NC	
	18oo-19oo	HB9QQ	EF	26	26	11	5	C	
	19oo-2ooo	DK1VI	EJ	26	--	4	1	NC	
	2oco-21oo	SM6EHY	GR	27	--	2		NC	

see over

UO5OGF continues

13.o8.	22oo-23oo	ON7EH	CK	26	--	4	1	NC
14.o8.	oooo-o1oo	SM6EAN		27	26	8	3	NC
	o1oo-o2oo	DF5DE	EK	26	--	1		NC
	o2oo-o3oo	OZ1EYX	GQ	26	--	4	2	NC
	o4oo-o5oo	SM1BSA	JR	27	--	6	3	NC
	o5oo-o6oo	SM4EXY	HT	38	--	1o		NC
	o7oo-o8oo	UR2RGM	MT	26	26	9	3	NC
	o8oo-o9oo	RC2WBR	NP	26	--	1		NC
	o9oo-1ooo	DJ3TF	FJ	26	--	2	2	NC
	1ooo-11oo	UA3PBT	SO	27	--	1	1	NC
	11oo-12oo	YU6AA	JB	26	26	7	2	C
	12oo-13oo	I4XCC	GD	28	--	4	6	NC
	15oo-16oo	DJ3TF	FJ	26	26	5	4	C
	16oo-17oo	DF5DE	EK	26	--	1	3	NC
	17oo-18oo	UA1ASA	PU	26	--	2	4	NC
	18oo-19oo	UG6AD	WA	27	--	6	1	NC
	19oo-2ooo	PA2VST	CM	26	--	1		NC
	22oo-23oo	DK1VI		26	26	3	2	NC
	23oo-24oo	OZ1CFC	ER	26	26	6	6	C

NIL:PAØHIP,LA2PT,DK1PZ,HG8CE,LA5IH,UK5IEC,IW2BHT,UK2RDX,
CT1BKW,F1JG,EIØRTS,UL7GBD, tnx fer info

UA3TCF WQ14a wkd:

23.o5.82	o2oo-o4oo	SM6EAN	FR	27	26	7	4	NC	
6.o6.	o8oo-1ooo	OK2KZR	IJ	27	--	1	1	NC	
12.o6.	153o-173o	YU1AWW	KE	26	--	1	1	NC	
21.o7.	19oo-2o45	UQ2GLO	KQ	27	27	15	14	C	
27.o7.	2ooo-213o	UB5GFS	RG	26	27	12	19	C	
28.o7.	2ooo-21oo	SM7JLT/1	JQ	26	--	3	8	NC	SSB
3o.o7.	o2oo-o4oo	OK2KZR	IJ	26	26	5	9	C	25s
	o94o-114o	OK1KKH	HJ	26	--	2		NC	
	21oo-23oo	YU1AWW	KE	27	27	2	2	NC	
9.o8.	133o-143o	UO5OGF	OG	26	27	5	1	NC	
1o.o8.	o8oo-1ooo	UA6YAF	TE	27	--	2	8	NC	
	1ooo-12oo	OK2SGY	IJ	27	26	1		NC	
	18oo-19oo	SM7KNK	HP	26	--	1		NC	
11.o8.	1ooo-12oo	OK2VMD	IJ	26	26	1	2	C	
	12oo-14oo	OL6BAB	IJ	27	--	2	4	NC	
	16oo-17oo	OH7TN/9	ND	28	35	15	4	C	11s
	22oo-23oo	OZ1EYX	GQ	26	--	1	4	NC	
	23oo-24oo	OK2BFH/p	KJ	26	37	6	6	C	18s
12.o8.	1ooo-12oo	OK1IDK/p	GJ	26	26	4	2	C	
	12oo-13o5	OK1KKH	HJ	26	37	6		C	12s
	15oo-16o5	OZ1CSI	HP	26	26	5		C	15s SSB
	173o-18o5	SK2KW	KY	37	27	9		C	RANDOM
	2135-2215	UA6LGH	TH	37	38	4		C	RANDOM
13.o8.	12oo-14oo	HG4KXG	JG	27	27	4	3	C	
	18oo-2ooo	OK1AFN	IK	26	--	1		NC	
	2254-233o	UK5EDT		36	37	3		C	RANDOM
14.o8.	oo2o-o1oo	UK5IEC		39	29	2		NC	RANDOM
	2ooo-21oo	UK6ABI		27	--	4	5	NC	

tnx fer info

NIL:YU1AWW,UA6YAF,HG4KXG,OH7TN/9,UB5GFS,YU3ZV,OZ1FTU,LX1GR,OK1OA,
DF6NA,DJ5MS,DK3FW,DJ5BV,DK6AS,LA5IH,YU2CCB,OE5XDL,YO6XR/p

il JTQ DF79j wkd :

11.XII.'82	1800-2000	HG8KWG	KG	27	27	4b	9p	C
	2000-2200	PA3CGR	DM	26	26	9b	14p	C
12.XII.'82	1800-2000	OK3TEG	JI	26	26	5b	3p	C
	2200-2400	DK2 PH	EL	26	27	7b	6p	C
13.XII.'82	0001-0020	SM5MIX	HS	26	26			C Rando
	2000-2027	OZ9 PW	EQ	27	26	6b	MNI p	C
	2100-2155	HG2 SU	JH	26	26	4b	MNI p	C
	2300-2355	HG6 NQ	JI	26	36	8b	MNI p	C
14.XII.'82	0000-0017	GM4CXM	XP	26	47			C
	0100-0130	DL4NAA	EJ	27	26	6b	7p	C
	0330-0355	OZ1EYE	FQ	27	27		C	Rando
	0403-0430	SM6AGJ	?	27	27		C?	Rando
	0529-0540	DDØ HZ	?	27	27		C	Rando
	2200-2310	PAØHWM	CK	26	26	7b	11p	C

NIL : G3WOH, PE1HTE, F6GGF, ON1BXS, OK2SGY, DL7AN, OK1MWI, OK1AFN, G4OIG, OH1ZAA.

tnx fer info

Y22HA GO71h wkd:

12.12.	0400-0515	I5WHC	FD	26	36	15b	18p	C
	2200-2400	UA3TCF	WQ	26	26	8	6	NC
13.12.	0400-0438	F1CNA	CE	27	26	20	13	C
	0600-0740	LX1GR	DJ	27	26	14	17	C
14.12.	0500-0520	IW5ACZ	FD	27	27	15	10	C
	0600-0655	YU3TSB	HF	27	27	many		C
	2100-2300	EA3ADW	BB	27	sri	QRM		NC
22.12.	2000-2055	UC2ACA	NN	26	26	24	27	C
28.12.	0400-0600	F5DE	AF	26	26	25	35	C?
3.01.	0600-0755	YO2IS	KF	26	26	13	13	NC
	1100-1209	IW3QBC	GG	26	27	12	17	C
	1500-1625	GW3NYY	XL	27	27	64	67	C
	1722-1810	UA3LBO	QO	26	27	6		C?
4.01.	0200-0240	GM4IPK	YP	37	27	22	33	C

NIL: F1FIB,GW4LXO,UB5LNR,G3WZT,GI4OPH

tks fer info, dr Detlev

AURORA NEWS

by DH Ø HAR

DF8AE (EM73e) wkd via Aurora

1.11.82					
1815	SM5CFS	JT24j	52a	52a	010°
2.11.82					
1650	LA7KK	FU62j	52a	55a	010°
1655	SMØDCX	IT70b	55a	57a	010°
24.11.82					
1455	UQ2GFZ	NR57a	51a	53a	040°
1505	G8XVJ	YN48f	54a	51a	030°
1517	SM7IQX	GP17a	54a	55a	030°
1524	SM1BSA	JR22e	52a	54a	030°
1529	G3UTS	ZO11b	51a	52a	030°
1534	OZ1BOK	GP21d	52a	55a	030°
1558	LA5EBA	FT22b	55a	55a	025°
1609	SM7CJC	HR25c	55a	55a	040°
1611	G6GN	YL48h	52a	55a	040°
1655	SM5CAK	HS36h	54a	55a	040°
1711	LA2OJ	FT43e	52a	52a	040°
1720	F9XG	AJ31e	55a	53a	030°
1740	G4KLX	ZN73e	52a	53a	030°
1742	F6EQG	ZI72b	54a	52a	030°
1836	G3BW	YO33g	54a	55a	000°
29.11.82					
1637	SMØHAX	JT51b	54a	55a	330°
7.12.82					
1630	SM6QP	GR21h	51a	55a	000°
1702	SM5IDM	HT79f	51a	51a	000°
1717	GM3WCS	YQ73c	51a	41a	000°
1825	SM6CMU	FR50b	54a	56a	015°
1840	LA4IH	CU47j	51a	52a	000°
1855	SK4NI	GT48d	52a	55a	015°
1943	SM5MIX	HS66g	55a	53a	330°
8.12.82					
1720	SM6AEK	GQ25b	52a	52a	030°
10.12.82					
1902	GM4CXM	XP09g	52a	55a	015°
1910	GM4CXP	YP37g	51a	51a	015°
2042	SM4GVF	HT76a	52a	44a	350°
21.12.82					
1745	SM5MGW	HS56d	51a	55a	030°
1901	GM4IAO	YR47h	51a	52a	010°
29.1.83					
1750	SM5CNQ	HS46c	51a	52a	010°
4.2.83					
1739	SM7JUQ	GP36h	55a	55a	320°
1750	UR2RQT	MS80e	52a	52a	350°
1852	LA4IAA	CS09h	52a	55a	330°
1901	SMØFMT	IT50f	51a	53a	010°
1911	LA3UL	FT78h	52a	52a	000°
1956	SM4NFL	HS04g	51a	53a	
2020	SM6KWJ	FR30e	54a	55a	
2128	SM5CBN	HS56c	52a	41a	
2135	SM6CMU	FR50b	52a	55a	
2142	GM4JEJ	YQ38g	51a	51a	
2223	SM5MIX	HS66g	51a	31a	
2343	LA6HL	CS09g	51a	51a	
5.2.83					
1250	SM6AEK	GQ25b	55a	53a	
1346	OZ1CGQ	FR53j	52a	51a	
1406	G4ITR	YN16j	52a	51a	
1410	GM4CXP	YP37c	53a	53a	
1420	SM6QP	GR21h	59a	59a	
1429	LA6ZW	ET68b	52a	52a	
1720	SM5CBN	HS56c	52a	33a	
1723	SM5MIX	HS66g	52a	51a	
1752	SM4FXR	HT57g	53a	55a	
1802	SM4GVF	HT76a	57a	55a	
2.3.83					
1406	SM7GEP	HR24e	52a	52a	
1423	SM4MNN	HT56d	52a	54a	
1435	SM6AEK	GQ25b	55a	53a	
1450	GM3WCS	YQ73c	59a	57a	
1451	SM7GWU	HS75c	52a	55a	
1513	SM5EFP	HT50e	52a	55a	
1654	UR2RIW	LS02e	52a	52a	
12.3.83					
2300	SM5MIX	HS66g	55a	52a	
15.4.83					
1709	SM4GVF	HT76a	52a	43a	

tnx fer info

DG7AT (fm44d) wkd in SSB:

4.2.83				
LA9PP	54a	57a	FT	QTF?
GM4NHI	56a	57a	YR	"
SM7NNJ	58a	57a	IQ	"
SM6EGX	56a	57a	GQ	"
SM6KWJ	58a	55a	FR	"
LA7AJ	56a	55a	FT	"
5.2.83				
UQ2GMD	55a	55a	LR	"
2o.12.83				
LA6VBA	53a	52a	ES	"
LA6R	52a	52a	ES	"
21.12.82				
SMØMMD	52a	hrd		"
LA4LR	52a	53a	CT	"

tnx fer info

DL7YS wkd via Aurora on 144 Mc from GM46b

821124	1802	SM6CMU	FR	0°	59a	59a	1921	F6KCP	BI	20°	55a	55a	
	1803	SM1BSA	JR	0°	57a	55a	1921	SM4VA	GT	15°	55a	55a	
	1818	G4IJE	AL	0°	55a	52a	2135	LA1TV	ET	20°	55a	55a	
	1820	OZ1EHW	FO	0°	56a	55a	2333	SM6CEN	FR	20°	53a	54a	
	1841	SM7LAD	GP	30°	57a	57a	2336	LA8SJ	FT	20°	58a	56a	
	1902	F6DWG	BJ	30°	58a	57a							
821207	1830	SK4NI	GT	20°	58a	57a	1903	SM5KWU	IT	20°	54a	55a	
	1838	LA3DV	ET	20°	59a	42a	1933	SM5BUZ	HS	10°	56a	57a	
	1844	SM5MIX	HS	20°	55a	55a							
	1851	SM4NFL	HS	20°	54a	55a							
821208	1830	LA6QBA	53a	hrd	FT	350°	1847	SM6AEK	55a	hrd	GQ	350°	
	1840	LA8SJ	53a	hrd	FT	350°	1850	SM6CMU	55a	hrd	FR	350°	
	1843	RQ2GAG	41a	hrd	MQ	350°	1900	UQ2AO	51a	33a	MQ	330°	
	1845	RQ2GAG	53a	55a	MQ	350°	1912	SM6AEK	55a	52a	GQ	320°	
821210	1714	SM4GVR	55a	hrd	HT	30°	1732	UR2DL	41a	hrd	?	20°	SSB !
	1715	SM5CAK	52a	hrd	HS	30°	1732	SM4KVV	55a	hrd	?	20°	
	1720	SM6MCO	55a	hrd	?	10°	1737	SM5CBN	55a	54a	HS	10°	
	1720	SM4COK	58a	56a	HT	20°	1740	SM5QA	54a	hrd	?	20°	
	1724	SM5EFP	55a	hrd	HT	20°	1750	SM4KVV	58a	55a	HT	20°	SSB
	1727	LA6ZV	55a	55a	ET	20°	1754	SM4EIM	53a	hrd	?	20°	
	1736	SMODCX	56a	hrd	HT	20°	1756	GM4FZH	53a	hrd	YS	20°	
830109	1734	LA6QBA	55a	52a	FT	10°	1749	LA3SU	52a	52a	FT	25°	
	1742	SM4FPD	53a	52a	GT	10°	1807	LA5LBA	56a	55a	FT	25°	
830204	1903	LA3UU	59a	57a	FT	0°	1943	UQ2GMD	53a	55a	LR	10°	
	1909	LA3UL	55a	53a	FT	0°	1948	LA3SU	57a	58a	FT	0°	
	1916	UR2RIW	55a	54a	LS	10°	1952	UR2RQT	57a	59a	MS	0°	
	1920	LA6CU	54a	55a	CU	10°	2012	RQ2GGS	55a	53a	LQ	0°	
	1932	LA60CA	53a	52a	ET	0°	2022	PE1DTU	57a	57a	CN	0°	SSB
830205	1355	SM4KVM	55a	55a	HT	0°	1455	SM5BKA	53a	52a	IT	0°	
	1406	SM5JZR	52a	54a	IT	10°	1518	SMOKCR	56a	56a	JT	0°	
	1416	GM4JEJ	52a	51a	YQ	10°	1555	SM6EUZ	54a	52a	GS	0°	
	1423	LA2YT	55a	53a	FU	0°							
830302	1322	UP2BJB	55a	57a	LP	45°	1414	SM1BSA	59a	hrd	JR	20°	
	1326	SM4KVM	58a	55a	HT	45°	1320	GM3WCS	54a	hrd	YQ	350°	
	1330	GM3JFG	55a	hrd	XR	0°	1426	LA6P	56a	hrd	FT	0°	
	1357	SM4MNN	55a	55a	HT	0°	1432	SM5KX	56a	55a	IT	15°	
	1430	SM5AXU	51a	52a	IT	10°	1507	SM4KL	51a	51a	GT	15°	
	1432	LA2SN	54a	hrd	ES	15°	1512	SM1BSA	53a	54a	JR	10°	

DL7YS cntd.

830302	1519	SM5CAK	56a	55a	HS	10°	1647	UK2RDX	56a	55a	MT	15°
	1524	DL2LAH	53a	54a	EO	10°	1650	LA2BBA	55a	53a	GU	20°
	1531	LA6P	53a	54a	FT	10°	1655	UR2RIW	55a	hrd	LS	35°
	1615	OH1DP	55a	hrd	LU	10°	1710	LA6QBA	55a	hrd	FT	15°
	1625	LA2XB	55a	56a	FT	10°	1717	OH1DP	52a	hrd	LU	20°

heard vy weak Aurora abt 2037 GMT.

tnx fer info

SM7LXV (GP48a) wkd

24/11-82

DG8NAQ	FJ
G6CBN	ZO
G6OZJ	ZP
OH2BJM	LT

17/12-82

SM3HYA	IU

23/12-82

RQ2GGV	LR

4/2-83

OH1GL	LU
GI8YDL	WP
GI4GVS	XO
PE1HVD	CL
G6NWF	YN
ON7HP	CL

5/2-83

DG5ZN	EK
DG4FAO	EK
G6ECM	AL

12/3-83

PE1AGJ	DK
UR2RKI	MT

PE1AAI(CM67d) wkd on 144 in SSB:

24. 11. 82

16.02	SM7EML	HQ	55°	737 km	
.17	DB5AI	FM	50°	363 km	
17.01	OZ1GOK	EP	65°	403 km	rst ?
.36	GI6ATZ	XO	35°	793 km	
.51	GI6DRK	WO	25°	882 km	

tnx fer info, dr Dolf

UA3TCF (KQ14a) wkd via Aurora on 144 MHz in cw:

821029

1425	*UA3MBJ*	*SS78e*	*59a*	*59a*	*20*
1432	*UA9FBJ*	*CS73d*	*57a*	*55a*	*20*
1441	*UK3MAL*	*TS75a*	*58a*	*59a*	*20*
1443	*UW4NI*	*YS29a*	*59a*	*59a*	*30*
1450	*RA9CES*	*ER19a*	*58a*	*59a*	*10*
1453	*UA9FFQ*	*CT46e*	*54a*	*58a*	*0*
1521	*UA9GL*	*CR02h*	*59a*	*59a*	*0*
1522	*UA9FAI*	*CS80a*	*59a*	*59a*	*0*
1545	*UA9CFH*	*ER19a*	*57a*	*58a*	*0*
1557	*SM5CFS*	*JT24j*	*57a*	*53a*	*330*
1642	*RA1ASK*	*PT03a*	*57a*	*57a*	*330*

821030

1329	*OH5LK*	*NU37g*	*59a*	*59a*	*0*
1337	*RA9FDD*	*BR09a*	*59a*	*59a*	*0*
1338	*UW4NI*	*YS29a*	*59a*	*58a*	*0*
1339	*UA9FBJ*	*CS73d*	*57a*	*59a*	*0*
1402	*OH3RW*	*MU24b*	*53a*	*52a*	*340*
1407	*RA9FBZ*	*CR46d*	*59a*	*57a*	*0*
1427	*OH5RE*	*NU35c*	*58a*	*55a*	*340*

821121

2300	*UA3MBJ*	*SS78e*	*59a*	*55a*	*340*
2305	*UK3AAC*	*SP19e*	*58a*	*55a*	*320*

UA3TCF contd.:

821122

0035	UW4NI	YS29a	59a	59a	350

821210

1658	UA9FBJ	CS73d	57a	59a	20
1702	UA9GL	CR02h	59a	59a	20
1722	SM1MKY	JR44g	55a	57a	330
1733	RQ2GGV	LR74e	56a	55a	330
1735	RQ2GAG	MQ01g	58a	59a	330
1737	OH1BS	LU42e	55a	55a	340
1738	OH2BXE	MU56h	56a	59a	340
1742	SM4GVF	HT76a	57a	57a	330
1743	SM2CKR	KX12g	57a	58a	340
1750	UA3IDQ	QQ64d	56a	57a	340
1752	SM7DLZ	IQ53h	54a	55a	315
1755	SM3AKW	JW31h	56a	42a	330
1758	SM5MIX	HS66g	53a	52a	330
1803	UC2ACA	NN18d	57a	59a	320
1806	SM5CNQ	HS46c	56a	55a	330
1824	OH6CH	NV01j	59a	58a	350
1834	UA9FFQ	CT46e	53a	59a	20
1851	UA9CNM	DR09e	53a	59a	20
1854	OH5BM	OV47b	59a	59a	0
1906	OH1DP	LU42j	55a	53a	340

821218

1434	UA9GL	CR02h	59a	59a	0
1435	UA9FAD	CR02j	59a	59a	0
1450	UA9FBJ	CS73d	57a	59a	0
1452	UA9CFH	ER19a	56a	59a	20
1505	OH6CY	MW70h	59a	59a	340
1512	UK2RDX	MT35g	58a	58a	340
1514	OH1XF	LU52j	54a	55a	340
1517	UA4NCR	YS28g	56a	57a	0
1518	RA9FBZ	CR46d	59a	59a	0
1520	RA1ALS	PT23a	57a	59a	0
1522	OH2BCI	LU40c	57a	58a	340
1524	UR2RFX	MT45e	55a	57a	340
1544	UK9CAM	EQ17h	56a	57a	20
1546	UA9CAF	DQ10c	57a	59a	20
1551	UA9FAI	CS80a	59a	59a	20
1552	UA9FCR	CT25f	59a	59a	20
1624	UV9EI	EQ17h	59a	59a	20
1628	UA3TFT	WS75f	57a	59a	30
1632	UR2RQT	MS80e	59a	59a	340
1800	OH2TI	MU65g	59a	58a	350

821219

1405	OH5LK	NU37g	59a	59a	350
1415	UA9FAI	CS80a	57a	58a	10
1417	UA9FCB		54a	59a	0

LA8SJ/p(GU62d) wkd via Aurora :

830128

1814	OH5BB	OV71C	54a	55a	30
1826	OH6ZAD	KW37f	57a	59a	30

830129

1650	SM3LBN	IU34b	59a	59a	15
1658	OH7AXA	OW40h	56a	55a	30
1719	PAØOOS/a	DN63c	58a	55a	0
1732	PAØHIP	CL34b	33a	55a	320
1742	GM3ZXE	YQ35g	56a	55a	340
1747	GM4IPK	YP05h	57a	56a	340

830226

2012	OH2BUQ/7	PW43H	53a	53a	20
2115	SM3JAW	JX56f	59a	59a	15

830312

1453	OH5BB	OV71c	55a	56a	25
1455	OH7WX	OW24a	57a	57a	25
1457	LA1GCA	CU38e	56a	55a	350
1459	UR2RIW	LS02e	56a	57a	45
1512	UQ2NX	MR43f	55a	55a	45
1521	OH6PA	KW47a	59a	59a	30
1524	OH5BM	OV47b	56a	59a	30
1529	UQ2AO	MQ01a	57a	55a	45
1531	UP2BKQ	KP26c	57a	59a	45
1543	G6WR	YO33g	57a	56a	310
1558	PA3BRS	CM70c	55a	55a	310
1617	GM4OGM	YP05b	57a	58a	330
1626	GI4OPH	XO33j	55a	51a	320
1635	GM3WCS	YQ73c	57a	56a	330
1637	PA3ANV	DM65a	57a	52a	330
1641	DL1YAW	EM73g	58a	55a	330
1644	PA3BIY	CM72c	56a	55a	330
1648	PA3APH	CL03j	58a	55a	310
1653	DF5DL	EL23e	56a	55a	310
1654	DF9CY	EL02e	58a	56a	310
1658	G3LTF	AL11d	57a	54a	310
1717	SK2KW	KY65c	59a	59a	10
1731	GM3JIJ	WS69c	58a	47a	320
2145	UC2CFD	NO55a	54a	59a	45
2149	UA1WDX	OR12b	57a	59a	45
2208	UA3MBJ	SS78e	59a	59a	45
2211	UB5PAZ	ML73a	57a	57a	70
2226	UA3AFV	SP29b	55a	55a	60
2238	UK3MAV	TS75f	56a	56a	60

830328

1553	UA1WDX	OR12b	55a	55a	45
1600	UK2CBB	NO55f	55a	55a	45
1631	UC2ABN	NN18e	56a	57a	45
1636	UC2AAB	NN18c	59a	59a	45
1702	UK3AAC	SP19e	57a	33a	60
1716	G4LIZ	ZN19f	57a	53a	320
1720	PBØACG	CL27h	57a	55a	310

830329

1436	RC2AKQ	NN19g	56a	56a	45
1438	UC2AA	NN18d	57a	59a	45

830330

1556	RC2WBH	OP45g	54a	55a	45

LA8SJ(FTØ5j) wkd via Aurora:

830109					
2247	UA1ASA	PU73g	56a	59a	30
830204					
1801	G4DHF	ZM19f	57a	55a	300
1803	G4IGO	YL38f	56a	57a	290
1806	G4DCV	AL67d	57a	59a	290
1808	G6WR	YO33g	55a	56a	290
1814	G4KGC	ZM65d	55a	59a	290
1818	PAØHIP	CL34b	59a	59a	290
1825	G3AZI	YN27a	57a	57a	290
1828	G6GN	YL48h	55a	55a	290
1829	GW3LDH	YN76g	55a	59a	290
1831	G3BHW	AL47d	55a	56a	290
1834	G3NOZ	ZL17j	53a	57a	290
1850	UC2ACA	NN18d	55a	59a	65
1943	RC2WBR	NP75g	58a	59a	65
830205					
1411	UB5PAZ	ML73a	55a	57a	75
1743	G4ERX	AL22e	55a	55a	300
1811	G3BHW	AL47h	33a	53a	300
1812	G4ABB	AM16j	56a	52a	300
1814	G5BM	YL08c	54a	54a	300
830207					
1447	UA2WJ	KO23a	55a	59a	45
1613	G6NB	ZL06d	55a	54a	300
830302					
1533	UK2RDA	MT44j	55a	57a	45
1616	PE1JBO	CL48j	55a	53a	315
1620	F6FLB	AK10h	33a	53a	280
1631	Y31QM/a	GL53g	54a	53a	0
830320					
1509	GM3XOQ	ZT04j	59a	58a	340
830406					
1435	OY5NS	WW77f	55a	55a	340

AURORA

in Jugoslawien (YU) :

YU 2 SZZ IG 54 F

06.09.82.

DF2HC	FN
DK1PZ	EL
DJ9BV	EN
DK1KO	FN
G4ODA	ZM
PA2VST	CM
G4CDC	ZN
F6DWG	BJ
PA2BBV	CM
DK6AS	FM
F6CER	BI
G8UK	AL
GW3NYY	XL
G4IYA	AL
DK3FW	EM
G4LOH	ZM
G3IMV	ZL

HRD: 13.07.82. GW4GVV, F6FOE, F6EOQ, Y22ME
06.09.82. DKØTU, DK2ZF, DF7DO, G4FUF, PAØERW, DH3AAB, ON5QW, G4FBK G3UVR

VY 73's MATKO

YU7QCA JF8Øf 06.09.1982.

14.03	G4ISM	59a	52a	AL56h
14.15	PA3AIZ	55a	55a	CM72g
14.20	DF7DO	55a	52a	DL3Øh
14.25	DF3RU	55a	55a	FJ49j
14.27	PA2VST	55a	55a	CM24j
14.32	G4FUF	55a	57a	AL22j
14.39	G8VR	54a	53a	AL32e
14.45	PAØERW	55a	52a	CL48b
14.49	DF7KF	55a	51a	DFØ4e

YU 2 SWN IG 64 A

06.09.82.

DK2PH	EL
DK3UZ	EN
DL9GS	DL
DKØTU	GM
DJ9BV	EN
PA2VST	CM
DK2ZF	DN
Y22QG	FM
DF2HC	FN
DF6LN	FO
DK1KO	FN

VY 73's NENO

YU3TCR HG64f

25.07.1981. DK3FW EM
" " " DK1WB FN

26.09.1982. PAØFTF CK
" " " DF7DJ DL

73'Marko

YU7QDM KF42d

06.09.1982. 13.37 DL9GS 59a 55a DL47g 14.00 DF7KF 59a 41a DKØ4e

73' Žika

YU1BB KE13c 06.09.1982.

13.20	OZ1ABE	55a	H R D	QTF- 15°
13.37	DK3UZ	59a	52a EN2Øc	" "
14.20	DJ9BV	55a	55a EN4Øc	" "
14.54	DK1KO	59a	56a FN12g	" "
15.48	PE1AGJ	55a	51a DKØ1f	" 350°

YU2KDE via AURORA

06.09.82. 17 02 PA2VST cw 55a/55a CM24j
" 17 18 DF2HC " 55a/51a FN31b

73 Bozo

YU2EZA IG54f

06.09.1982. DK2PH EL QTF - 1Øº

YU7QDM KF42d via AURORA

06.09.82. 1437 DL9GS 59a 55a DL
1500 DF7KF 59a 41a DK

PAoXMA (DM44h) wkd via Aurora on 144 MHz in CW.

821218

1628	SM5MIX	HS69c	55a 42a	20
1818	LA8SJ	FT05j	55a 55a	10
1827	LA6QBA	FT05c	52a 52a	10

821220

1745	GM4CXM	XP09g	53a 52a	10
1805	SM6AEK	GQ25b	52a 53a	10

821221

1905	SMoDCX	IT70b	55a 55a	10
2002	PAoOOM	DN54g	55a 52a	45

821223 all ssb

1642	GM8YJU	YO05a	41a 51a	25
1706	GM8YDZ	WP67d	53a 53a	20
1751	SK6OE	???	42a ??	20

830109

1657	LA1IAA	CS09h	52a 53a	15
1710	LA9UX	FU79f	52a 52a	20
1805	GM4ILS	YR24e	54a 55a	10
1812	SM4AKZ	GT58j	54a 54a	15

830129

1803	SM4PG	JT24j	52a 52a	355
1806	SM5CFS	HT51c	55a 55a	00
1842	GM3XOQ	ZT04j	52a 53a	00

830204

1755	LA9LG	CT29j	57a 52a	15
1818	G4DSF	YO33g	55a 55a	00
1838	G6WR	YM19f	52a 53a	00
1845	SMoDME	it60h	55a 55a	00
1850	LA2DH	CT19g	55a 55a	00
1852	SM5ARQ	HT50f	56a 57a	00
1855	SM5BKI	IT37j	52a 55a	00
1911	DK3IK	DJ55f	59a 55a	60
1920	SM5CFS	JT24j	59a 54a	10
1925	SM5FNU	IT23d	52a 55a	10
1928	SM5KWU	IT34h	52a 55a	10
1931	SM7IWG	HR63g	52a 57a	10
1936	GD3YEO	XO???	52a 55a	355
1940	SM5CAK	HS26h	59a 59a	10
1942	SM5MGW	HS56b	59a 59a	10
1946	SM1CJV	JR62b	57a 57a	10
1947	SM6BLV	GR41a	55a 59a	10
2020	RQ2GAG	MQ01g	52a 55a	20
2025	UR2RQT	MS80e	52a 55a	20
2046	SM6EKP	GR31g	56a 57a	25
2058	G4GPX	ZK19j	52a 52a	35
2110	LA1YCA	DS31c	52a 53a	35
2112	LA6P	FT03c	54a 57a	30
2121	SM4JCJ	HT65j	55a 59a	25
2127	LA6OCA	ET69h	57a 55a	30
2131	LA3SU	FT13g	51a 52a	25
2134	UR2RQT	MS80e	52a 55a	15

830204

hrd OZ7IS and G3LTF on 432 MHz around 2035 GMT,QTF 35

hrd G6WR and G4MKF on 70 MHz aronnd 1840 GMT up to 54a

830205

1735	SL5AR	?????	51a 51a	15
1739	GM3WTA	YR68b	55a 58a	15
1743	SM5MWG	HS56b	57a 58a	15
1749	OZ1GMG	EQ04h	59a 55a	15
1757	LA5BT	FT04c	55a 57a	15
2236	LA8AK	DS70b	55a 58a	15
2241	SM6EUZ	GS74j	59a 52a	20
2245	SM6AWW	GR25a	52a 52a	30

830206

1521	GM4FZH	YS33d	52a 51a	15
1529	LA5LBA	FT68f	52a 55a	10
1540	SM6QP	GR21h	52a 57a	20
1602	GM4DJS	YP11e	52a 42a	05
1618	GM3JIJ	WS69c	42a 37a	355

830207

1526	SM7BYB	HQ30a	55a 55a	35
1541	G4EUE	ZM33g	56a 56a	35
1550	SM6EAT	GR48a	52a 51a	30
1602	LA6CU	CU47j	59a 58a	355
1609	LA3SU	FT12g	52a 52a	350

830212

1320	SM5CNF	HS49f	55a 58a	20
1324	SM6LPG	GS60h	55a 55a	20
1349	SM6AWW	GR25a	55a 54a	30
1444	PAoKDV	DN71j	55a 52a	50

830215

1834 OZ1FDJ/LA DT19e 52a 52a 10

no other stations via Aurora

Heard on Febr.5.83 on 70 MHz EI4RF WN38c 70.13 beacon 52a GB3BUX 51a

I-am very interesd im crossband qso's 70/144 MHz, rx 70.200 and my tx on 144.144 MHz CW.

tnx ferinfo, dr Marc

Please send your infoś tiped on a machine. Thanks !

73, Frank

MOON BOUNCE

conducted by D F 7 V X

Jan,DL9KR who has done an excellent job editing this Colum from 1980 will be extremly busy with his daily work.So he asked me about help.Now, I will take over the DUBUS-EME Info for some time. Many thanks to Jan for his famous work!

Two Highlights we have got in the last Time. The 6.ARRL-EME-Contest Results and the EME-DX-Expedition to the GREENBANK Radio Astronomy Observatory in WVA on the 13. to 16. of May 1983.

Last Fall(1982) the EME-Competition was attended by 109 different Logs. The activity Level were very high;compared to 87 Logs last Spring. High score for the first Weekend goes to the single OPs like WA1JXN,KI7D,W5UN; on 2-meter. 18 different single OPs from Europe on 144 MHz!
The competition on 432 MHz was very intense among N9AB,I5MSH, F9FT and Z25JJ. 30 only 432 MHz Stations sending logs. Because of a work conflict Jaan,DL9KR decided to sit out this contest. The big contest News is of course the MULTIBAND Result for the Europeans. HB9SV the 1. ;DL7YC No.3; G3LTF No.4

Some short Info about the NRAO-K8HUH-EME Test on 432 MHz.
In the EME-Net W3IWI told something about the Results. 132 different Stations worked;among there some single Yagi stations; 35 or more 2way-ssb contacts; The system: very low noise radio astronomy Front end,one of the 140 feet Dishs, 150 Watts directly at the Feed.
W3IMY asked me about a recording Tape.If you got his Signal on the Recorder,send a copy to K8HUH please.

Technical: You can found an updated bibliography of EME-articles and litterature in the HAM-Radio-Magazin Feb81 and June 82. Requests for additional information can be made by writing William Orr,W6SAI c/o Varian-Eimac,301 Industrial Way, SAN CARLOS Calif.94070. Its called the Eimac-Eme-Notes.

Moontracking: We want to publish a list of available Moontracking Progams. Let us know your Callsign,Typ of Computer,the Memory Medium.

Example:			
	DL7QY	Commodore 8032	5.25" Disk, Listing
	DF9CY	ZX 81	Tape,Listing
	DC7SN	HP 41C/cv	Quad-Ram,Printer,Listing
	DF7VX	APPLE 2	Tape, 5,25"Disk,Listing

Stations activities:

144 MHz MOONBOUNCE by UA3MBJ 25.06.82 OH7PI 0/0,27.06.82 Yu1AW 0/0, 10.10.82 K1WHS 559/0,WA9KRT 0/0, SM4GVF 0/0, 7.11.82 WA1JXN/7 0/0, 4.12.82 W5UN 519/0, N7WS 0/0, K1WHS 559/0, 5.12.82 G3POI 0/0, 6.12.82 SM5FRH 0/439, 26.12.82 YU3USB 519/0, 29.12.82 SM5FRH 529/0, 2.1.83 WA4LYS 0/0, K1WHS 539/539, KY4z 0/0, KB8RQ 0/0; TNX vy much for fb info dr Nick

UA3TCF sends a long List of Stations heard and worked: During the EME-Contest he heard 54 stations (new: KB7N,KE5C,YU3ULM,KP4EOR, HB9QQ,WA7JUO,K2QR,SM2ILF,W2CNS,K1FO) 17 of them he worked!! 9.10.82 wkd DK4TG partial,heard WA1JXN,W5UN,KB8RQ, 26.11.82 heard YU3USB. 27.11.82 wkd YU3USB, heard W5UN,OH7PI, SM5CFS, 28.11.82 wkd DL8DAT,W7IUV, heard YU1AW,YU3USB,F6EOQ,

OK1MBS,DK2BL,UA1ZCL,W2CNS. 4.12.82 wkd SM4GVF,N7NW,VE7BQH, W2CNS partial, hrd SM2GGF,LA1TN,SM7BAE,KP4EOR,OZ1EME,K5OKG(NEW) DF9RJ(new),WA4LYS,UA1ZCL,KD9Z(new),KR5F,WA9KRT,WA4NJP,WØRWH, WA1JXN,W5UN,VE2DFO,DK4XI,N7WS(new); 5.12.82 wkd OZ1EME,JA6DR, SM5CFS,ZS6AVL partial,SM4IVE partial, hrd W2CNS,K1WHS,WØRWH, KR5F,I6WJB,W5UN,OK2TU(new),WA4LYS,WA9KRT,SM4GVF,KB8RQ,OH7PI,DL8DAT OK1MBS,W7HAH,WB7TYU,SM2GGF,W7IUV,YU3USB,WA2GSX,DK4XI,SM7BAE,DJ5DT, EA3ADW(new),UA1ZCL; 25.12.82 wkd DK4TG, hrd WA4LYS,DK4XI,K9XY (new),DL8DAT,F6EOQ,SM4IVE,SM5FRH,W5UN,YU3USB,I1RSQ; 1.1.83 wkd SM4IVE partial; 2.1.83 wkd YV5ZZ,WA8ZHE, hrd SM2JAE(new),I1RSQ, Y22ME,WØRWH,LA1TN,WA1JXN,DL8DAT,OH7PI,WØRT(new),W7FU,WA6MGZ(new), and KB8RQ.

UB5JIN worked an impessive List of stations.He uses 8 times 9el. homebrew Yagis, 2 times 4CX350A,Gasfetpreamp. 0.5db and the Rx-Bandwidth is 250,450 Hz. His working status is 52QSOs,38 different stations,15countries and 5 Continents!! 43% Random QSOs.
26.5.82 wkd:N4GJV, hrd: W7HAH. 28.5.82 wkd: YU1AW (fb signal). 29.5.82 wkd: Yu3USB, hrd: KR5F,KB[illegible],F6BSJ,G3NSM; 14.8.82 wkd: I6WJB,(FIRST EME I-UB5)!!! hrd:F8ZW,F6BSJ,SM7BAE,SM2GGF; 15.8.82 wkd: F6BSJ fb qso, JA6DR (FIRST EME JA-UB5)!!!,hrd: Y22ME F8ZW,G3POI; 6.9.92 hrd:F6CJG,ZS6ALE and UA1ZCL. 7.9.82 Wkd: F6CJG hrd: OH7PI; 9.10.82 EME ARRL TEST wkd: F6CJG,F6BSJ,ZS6ALE (FIRST EME ZS-UB5), YU3USB,Y22ME,WA8ONQ,WA1JXN/7, Hrd: UA1ZCL,SM2GGF, WA4NJP,KI7D,SM4IVE,SM7BAE,WA4LYS,KR5F,YU1AW,SM4GVF,VE7BQH; 10.10.82 Wkd: OH7PI,F6EOQ,K1WHS,569/539,YV5ZZ (FIRST EME YV-UB5)!! Hrd: I6WJB,SM7BAE,F6FOE,SM2GGF,UA1ZCL,WB5LBT,WBØTEM,WA9KRT, K1NMS,VE2DFO,DK4XI,KR5F,YU3USB,OZ1EME;
29.11.82 we try to work with a single Yagi. 16Elem. h.b. F9FT Yagi. Wkd: VE7BQH 0/0, RANDOM-QSO !! ; Later W5UN 0/0 3db max. 30.11.82 Hrd were WB5LBT and VE7BQH with the single 16 elem. ; He Wkd: UK3AAC, 3.station with that Ant.
In 1983 UB5JIN will be Qrv on 432 MHz EME !

UA1ZCL reports working(all0/0) on 9.10.82,10.10.82 and6.11.82 , 7.11.82 48 different Stations with 23 Multipl. So he got 110400 points. 9.10.82 Wkd: SM2GGF,OK1MBS,ZS6ALE,YU3USB,F6BSJ,OH7PI, OZ1EME,F6CJG,WA1JXN/7, VE2DFO,KI7D,SM7BAE,KY4Z,W5UN,VE7BQH, SM4GVF; 10.10.82 Wkd: DK4TG,WA2GSX,WA4NJP,WBØTEM,DJ5DT,K1WHS, WB5LBT,DK3FW/p,K2QR,WA8ONQ,SM4IVE,DL6BAG/p,DL3YB; 6.11.82 Wkd: I2ODI,LA1TN,W5UWB,W8WN,WB8PAT,W7IUV,DJ5MS,WA9KRT,N7WS; 7.11.82 Wkd: KB8RQ,WA8ZHE,YU1AW,EA3LL,HB9SV,DK4XI,Y22ME,K1FO, KB7N, and last but not least F6FOE !!

432 MHz

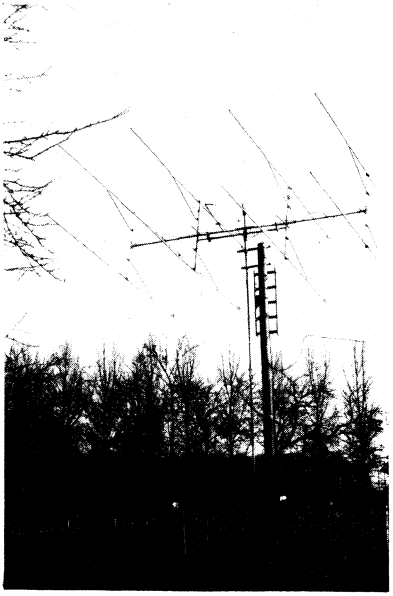
DF9CY Chris did not get a lot of time to operate last 2 Month. He Wkd on May 14.83 K8HUH 539/549 On May 20.83 SM6CKU on random!M/O; OH6NU O/M; Hrd: HB9G,OKØWCY,K9HMB, SM6CKU; all "O" copy.

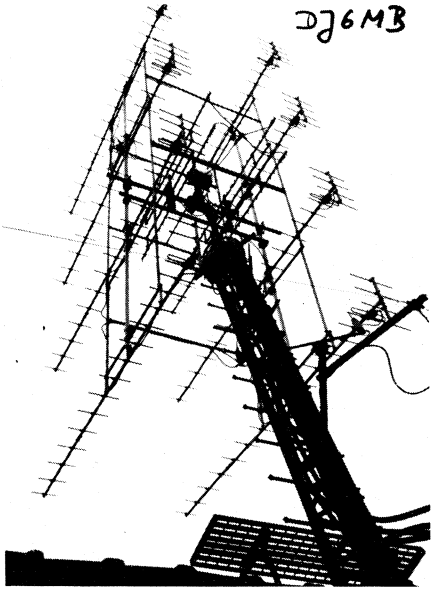
DL6WU Guenter did very well on April 22.83 Wkd: SM6CKU O/O, OE9XXI M/O, HB9SV 449/429, K3QCQ O/O;

DF7VX Hellmuth reports very poor conditions during the April and May skeds. He Wkd:April16. SM6CKU O/O May 14.83 YU1AW 449/529 K8HUH 559/559; May 15. K8HUH 449/539; On the May Sked Weekend most Contacts negativ.Only Wkd: May 20. OKØWCY M/M, K5JL 449/449 and Hrd : SM6CKU 449, K5FF 449; no own echos. May 21. Wkd: K2UYH 449/449 Hrd: W7FU "O", KAØY 449; On 432MHz April and May was definetly not a Yagi Month.

DJ6MB Uwe reports us: Dec.Ø2.82 Wkd: UA3LBO M/O; Dec.Ø5.82 Wkd: HB9SV O/O; DL7ZL M/O; Dec26. DK1PZ M/O; Jan29.83 Wkd: G3LTF M/M, LX1DB O/O, SMØDJW O/O; Feb.27.83 VK3BKF O/M; Mar.26. SM6CKU 349/339, JA9BOH 439/439; April 17. KL7WE M/M; April 24. YU2RGC O/M; May 14. K8HUH 559/559, I5MSH 549/449, W7FU 439/339, K5JL 549/459; May15. K8HUH 55/55 on SSB! W5FF O/O; My working status now: 65-EME-QSOs, 17 countries, 38 different Stations.

LA1K It will be a new country on 432MHz-EME. We have no reports but heard in the EME-Net that he worked DL9KR, YU1AW, I5MSH and K8HUH;





UA3LBO Walerij worked from Dec.82: Dec.2. DJ6MB O/M, DK5AI O/O, DK1PZ O/O(new), DJ6MB 529/519; Hrd mni on random!
Dec.3. Wkd: ZL3AAD O/O (new), YU1AW 559/539, YU2RGC O/O, WB5LUA O/O; The skeds: VK5MC O/- not complet; OH6NM O/- , YV5ZZ T/- , G4DGU O/ - QSB and strongwind.Have Hrd my own echos all the time!
Dec.26.82 Wkd: DL9KR O/O; Jan.2.83 G4EZN O/O; Jan.3.83 G3LTF O/O; From Jan.4. to Feb.15.83 I am not active because of high wind. 20-30m/sek.
Feb.20. Wkd: DL9KR 559/559, LX1DB 559/449, W6A3N O/O, DL9KR 559/449; Feb.25. W1AW 559/539, JA4BLC O/O,(22), G3LTF O/O, OK1KIR O/O (23), GW3XYW O/O(24), HB9SV O/O(25), SMØDJW O/O(26);
Feb.26. Wkd: SM3AKW 539/539, DL9KR 559/559, KAØY O/O(27), OH6NU O/O(28), W7GBI O/O(29), VE4MA O/O (30)? I5MSH 559/439, DL9KR 559/449, SMØDJW 529/O ;
Feb.27. Wkd: W1JR O/O, W5YUQ O/O(31), K3NSS 579/339(32), K4QIF O/O(33), OH6NM O/O(34)!
Working status now: 47 QSOs, 34 different stations, 5 Continents;

OK1KIR Tonda reports from Jan.1983
Jan.28. Tx not qrv because of a fault caused by broken blocking capacitor in the Power-Amp.
But Hrd: HB9SV, F2TU, JA4BLC, GW3XYW ;
Feb. Wkd: UA3LBO O/O (65) and DXCC 33, K5AZU 339/339, K2UYH 449/449, OH6NM 449/339, K5JL 449/449 (66), K3NSS 449/O, K5FF O/O(67), N4GJV O/O(68), K4PKV O/- partial because of pulse QRM; maybe Radar; Moon very low above the horizon.
March: Wkd: SM6CKU 449/439(69), WØRAP O/M(70),
OKØWCY Wkd: SM6CKU 339/339;
Hrd: AD1C, K4QIF, K2UYH, K3NSS;
April Wkd: SM6CKU 339/439, N9AB 449/O, VE7BBG 449/439(71), SMØDJW O/O(72);
OKØWCY Wkd: DL9KR 559/559, YU1AW 559/549, G3SEK M/M, K5JL 549/549, partial K4PKV M/O, KD6R 449/O, W1JR O/O, N9AB 449/449, K3QCQ O/O, VE7BBG 449/449, K8WW O/O, JA7BMB M/M, SMØDJW O/O YU2RGC 449/449, HB9G 449/439, JA4BLC O/O;
Nil in the skeds with DF3RU, VK3BKF and JA8QQ.
Hrd: VE4MA, HB9SV, OE9XXI, OH6NU, K4QIF, VK5MC;

OKØWCY QSL-Cards are in the printing!

Working Status: 72 Contacts, 33 Countries, 19(US) States, 23 (10*20)Fields, 148 (1*2) Fields;

1296 MHz

OK1KIR : From Jan. to April they worked:
Jan.2.83 K2UYH 449/439, W7GBI O/O, VE7BBG 549/529,
Hrd: OE9XXI, O/ DJ8QL M/ ;
Feb. Wkd: G3LTF 449/449, Z25JJ 449/O, OE9XXI 449/449, W7GBI 449/449, K2UYH 449/449, VE7BBG 549/539, WB5LUA O/O,
Hrd: SP5CIC/SMØ M/- but sorry - nothing in the sked; trouble with the AF-Filter, hrd YU1AW T-M in his qso with W7GBI; Nil in the sked with ZL3AAD , although own echoes detectable all the time!
March: Wkd: OE9XXI 449/439; Nil in the sked with K4QIF;
OKØWCY Wkd: G3LTF O/O, Z25JJ O/O, OE9XXI O/O, K2UYH 339/339; Hrd were: YU1AW, OZ9CR, W7GBI;
April: Wkd: GW3XYW M/O, partial W7GBI O/O, OE9XXI 339/339, VE7BBG 539/539;
OKØWCY Wkd: GW3XYW M/M, OE9XXI 439/439, K4QIF O/O,

VE7BBG 549/539, Nil in the skeds with SP5CIC/SMØ ,YU1AW and DJ5BV;
Hrd: OZ9CR, G3LTF ;
Our working status: 22 Contacts, 18 Countries, 5(US) States,
13 (10*20) Fields, 67 (1*2) Fields;

We are now using improved automatic Moon-Tracking with compensation of horizontal parallax. It compensates the error each 30 sec. We have also been checking cirkularity or suppression of the opposite polarisation by switching left to right on our Antenna of various stations. All seem ok except OE9XXI who has the opposite sense of pol. suppressed by only about 2db. Now after some mods to our 1296 MHz power-Amp. - the Amp. works without trouble. The Cathode circuit according to G3WDG. We are going to describe the whole Power-Amp. with GI7b for those interested in.

P R O G R A M M Z U R B E R E C H N U N G D E R
M O N D B A H N F Ü R H P - 4 1 C / C V

Dieses Programm errechnet, nach Eingabe des Tages und gegebenenfalls der Uhrzeit, Azimut und Elevation des Mondes jeweils im 15 Minuten-Abstand.
Das Programm benötigt 1382 Bytes sowie 82 Datenregister. Es werden Quad-RAM (bzw.HP-41 CV) Drucker und Kartenleser benötigt.
Das Programm ist auf schnelle Ausführung optimiert. Es braucht "nur" 70 s bis zum Druck der ersten Tabellenzeile, für jede weitere Zeile sind es 14 s.
Die 18-seitige deutsch/englische Programmdokumentation ist gegen eine Kostenerstattung von DM 5,-- (oder äquivalent) und (falls gewünscht) 9 Leerkarten bei Norbert Mücke, DC 7 SN, Draisweg 18 1000 Berlin 45 erhältlich.

P R O G R A M M O O N - T R A C K I N G - S T A T U S
F O R H P - 4 1 C / C V

This program computes after the input of the year (and if you want the beginning hour) the azimut and the elevation of the moon every 15 minutes.
The program needs 1382 bytes and 82 data-registers. The konfiguration is: HP-41C and Quad-RAM (or HP-41CV), printer and card reader. The program is optimized for fast operation. It needs "only" 70 s for printing the first data line, further lines every 14 s.
The german/english program documentation (18 pages) is available for DM 5,-- (or äqiuvalent) from Norbert Mücke, DC 7 SN, Draisweg 18, D-1000 Berlin 45.

by DL7QY

DUBUS affairs 4/82 part 2

Nachtraeglich zum Aufruf in DUBUS 4/82 sind zwischenzeitlich noch einige Briefe mit Stellungnahmen eingegangen, woraus die wichtigen Teile hier nachfolgend erscheinen.

LA8SJ writes:...I find the QSO reports the most interesting in the whole magazine. In my case the Aurora reports are of special interest. Things that I can find out from reading these reports: -Reports from for instance HB, OE, YU, I, UA4, UA9 stations can tell me hwo close to my QTH they have been able to work, and if it seems to be possible for me under even better condx to work them. Reports from SM, OH and OZ stations tell me what was possible to work from an aerea close to my own QTH. I can find out what rare squares are active on Aurora. My opinion is that the traffic reports should rather be extended than taken away.

DF6OB schreibt:...da fuer jeden Ausbreitungsweg andere Voraussetzungen gelten, gehe ich auf jeden Mode separat ein. TROPO: Auf 144 MHz halte ich nur Verbindungen mit einer Distance von ueber 1000 km fuer berichtenswert. In Norddeutschland gibt es normalerweise jeden Monat eine kleine oder groessere Oeffnung nach G oder manchmal auch nach U. Ein QSO zwischen FM und ZM square ueberbrueckt zwar eine Entfernung von etwa 800 km, ist aber eine fast alltaegliche Sache, was ganz besonders zutrifft, wenn sich die Stationen in DL im Ruhrgebiet befinden. Im Gegensatz dazu sind Verbindungen mit EI, UA3 und dem noerdlichen GM relativ selten und daher unbedingt erwaehnenswert. Aehnliches gilt fuer andere Richtungen und Laender, auch fuer Sueddeutschland. Die Argumentation trifft mit einigen Einschraenkungen auch fuer 432 MHz zu, daher plaediere ich dafuer, die Mindestentfernung auf 600 km heraufzusetzen. Da ich die Verhaeltnisse auf den noch hoeheren Baendern nur unzureichend kenne, kann ich dazu nicht Stellung nehmen. Aurora: Auf 2m halte ich ein Limit von 1000 km wieder fuer sinnvoll, allerdings mit der Einschraenkung dass ueber QSO's an denen Stationen suedlich des 48. Breitengrades beteiligt waren grundsaetzlich berichtet werden sollte. Da Aurora auf 70cm nicht ganz so haeufig ist, wie auf 2m, ist es vielleicht sinnvoll weiterhin ueber alle QSO's zu berichten. MS: Meiner Ansicht sollte jedes MS QSO veroeffentlicht werden, denn wie gut ein Schauer in dem betreffenden Jahr gewesen ist, laesst sich dadurch beurteilen. Ausserdem haben bei weitem nicht alle MS-Stationen die Moeglichkeit oft oder ueberhaupt im VHF net activ zu sein; daher ist das DUBUS magazine haeufig die einzige Moeglichkeit detaillierter zu erfahren, was bei dem Skedpartner angekommen ist, denn ich halte es fuer unakzeptabel jeden einzelnen persoenlich anzuschreiben. Besondere Bedeutung kommt auch dem zu, wenn die final rrr's in den letzten 5 Minuten des QSO's gesendet werden, und das Resultat der Verbindung nur der dann empfangenden Station bekannt ist. Es: Etwas besseres als die bisherige Praxis beizubehalten, faellt mir hierzu leider nicht ein. EME: Die Berichterstattung ueber EME finde ich sehr kaerglich, was wohl teilweise auch daran liegt, dass nur wenige ueber ihre Arbeit berichten. Ausserdem ist der Lunarletter dafuer auch das geeignetere Medium. TEP: Hier stellt sich eher die Frage, wie sich ein solches Ereignis seiner Bedeutung entsprechend gewuerdigt werden kann.

DL1MF berichtet:...von meiner Sicht moechte ich sagen, dass die DUBUS

Hefte wirklich erstklassig sind; und auch die technischen- und alle news Berichte hervorragend informieren.

G8ROU writes:..with reference to your question in DUBUS 4/82 I am in favour of continuing the QSO reports which I find interesting.

DK5AI schreibt...die QSO Listen im DUBUS sind fuer mich noch immer interessant; man sieht so die Aktivitaet in noch nicht gearbeiteten Feldern. Meine Meinung: macht weiter so!

DF8AE meint: Ich halte Aufmachung und Inhalt der DUBUS Hefte, so, wie sie sind, fuer gut. Insbesondere die Veroeffentlichung der Listen solltet ihr m. E. beibehalten. Es gibt sicher viele OM's die sie aufmeksam lesen.

DJ6CA schreibt:...ich waere dafuer, wenn die langen QSO Listen auf 10% gekuerzt werden. Z.B DJ6CA, EM72 arbeitete via MS: DL7QY, SV1AB, UA3AA u.s.w. gehoert: UA3TF, LZ1AB u.s.w. Das muesste genuegen, und macht auch weniger Arbeit. Die technischen Kurzartikel sind ufb! Auch die Bakenlisten sind sehr hilfreich. Mir wuerde besonders gefallen, wenn verschiedene Diskussionen z.B.ueber den weltweiten QTH Kenner, Frequenzbereiche u.s.w. nur durch kurze infos angeregt werden. Dann wird das DUBUS Heft durch Fotos von DX'ern noch interessanter. Ruhig die OM's mal aufforden.

G3PBV writes...suggestion to reduce lenght of Tropo lists is to increase distance - dont consider 500km's on 2m and 300 km on 70cm as real dx. Many lists, including mine, only best long DX suggest minimum 800 km for 2m and 500 km on 70cm. Also the TOP lists are a bit unbalanced. On 2m with much more activity only 179 entries with lowest score 165 squares. Whereas on 70 cm 191 entries with only 11 squares as lowest score. A.d.R. Dear Dave, we try to spend one more page for the TOP list (2m than 336)in the future. But have to wait until the 336 places are filled. At the present time we have only 253 entries for 2m. 73 de dl7qy

G4MCU reports...in DUBUS 4/82 you asked for readers' opinions as to whether there are too many lists of QSO reports in the magazine. I think that this is not the case. Like many people I enjoy reading what other stations have worked as it gives an idea as to what conditions were like on a particular day and whether one has missed the best DX. Also your lists must be useful to anyone who is compiling a record for propagation studies an research. So please print lots of QSO lists!

G2FKZ (I.A.R.U. Aurora manager) writes: ...well, for me its Aurora results also I like your mix of technical articles, but I realise for many people that they may want other things. Looking more long term on Aurora we want beamheading data because we want to know how the Aurora moves across Europe, and the only way of getting this is via beam headings, I looked at this problem a little and was surprised to find it does not appear to move very much, but thinking abt it later this tyes in with the the very fast stoping and starting of Auroras which jump from one location to another.

PE1DAF schreibt:...ich moechte wegen den vielen QSO Listen auch reagieren. Am meisten interessiert mich VHF und UHF Technik; aber nicht die vielen Listen ueber QSO's. Publizieren sie mehr ueber Technik und QSO's nur ueber 70 cm.

Y22ME schreibt...einige Bemerkungen zum DUBUS Heft 4/82 und den auf Seite 245 angesprochenen Problemen. Technische Artikel: Sind teilweise sehr speziell und fuer mich nur informatorisch. (Speziell in juengster Vergangenheit) Tropo: Hier werden die Massstaebe je nach Ausruestung unterschiedlich sein, jedoch sollte man nur echte DX Raritaeten bzw. Erfolge erwaehnen. Z.B. sind 2m QSO's mit ZL, ZM, ZN nicht unbedingt als kompletter Datensatz erforderlich. Es wuerde genuegen zu sagen: 10 mal G in ZM,ZL....(nur Beispiel, habe nichts gegen die G's,hi) Seltene Stationen bzw Grossfelder sind erwaehnenswert, auch die groessten Reichweiten einer Bandoeffnung. Um einigermassen ein einheitliches "Augenmass" zu finden, sollten die Entfernungslimits erhoeht werden. (2m> 800km, 70cm> 500km) Fuer 70cm koennte man die jetzige Form mit QRB >500km beibehalten. Aurora: Aehnliche Situation wie bei Tropo. Bei normal zu erreichenden Gebieten sollten die Stationen nicht einzeln genannt werden. Inwieweit eine QTF Angabe noch erforderlich ist, ist ausser Ausnahmen fraglich. Eventuell eine Aufstellung der aktiven Stationen bei bestimmten Oeffnungen z.B. CT-LA8OU XQ-GM8MVB/p....Dann findet man die "verlorenen Rosinen". Eventuell koennen auch die einzelnen Zeiten- und Rapportangaben entfallen. Z.B. Aurora am XX.von 1435 bis 1635 max. 1550, dann nur Rufzeichen und QTH. Komplette Daten nur bei besonderen Situationen (besonderes DX, weite Verbindungen...). Da die 70cm Verbindungen relativ gering sind, wuerde ich hier fuer die Beibehaltung bisheriger Infos sein. MS: Angaben der geplanten Skedzeit ist nicht sinnvoll, sondern die Zeit bis zum kompletten QSO! 02-04gmt nicht, sondern 02-0235. Bei der Angabe der Pings und Bursts natuerlich auch auch nur innerhalb dieser Zeit und nicht 10 Bursts danach mit "rrrr", NC sollten miterscheinen. Fuer die NIL genuegt aber eine Rufzeichenaufstellung, die nicht fehlen sollte! Eventuell kann die Rapportangabe entfallen, da die Aussagekraft recht gering ist. Einige Stationen geben z.B. kaum 26 weil ihr call eine 6 enthealt. (Z.B. DK6AS- Seite 284). Top-Liste: Ist es nicht sinnvoller statt der diversen ODX nur eine Angabe zu machen und eventuell den Laenderstand (z.B. nach DXCC oder WAC) aufzunehmen. Eine Wertung nach Laenderzahl wuerde ich nicht vorschlagen, da einige QTH's zu stark benachteiligt sind. QTH Loc: Trotz fehlender Vereinbarung der Regionen der I.A.R.U. duerfte sich das Maidenhead Loc. system speziell bei EME Verbindungen durchsetzen. Die fuehrenden W's haben begonnen. Eventuell solltet ihr hierauf nochmals eingehen. Rechnerprogramm fuer Taschenrechner fuer die Umwandlung der Laengen- und Breitengrade- QTH System- und MH Fieldsystem und die weltweiten Entfernungsberechnungen sind bestimmt fuer viele OM's interessant. Sonstiges: Ich vermisse einen Bericht ueber rauscharme Vorstufen fuer 2m (BF981, GaAs FET)fuer EME und spezielle DX fans. Neue Antennen? Messergebnisse? (2m, 70cm). Der DUBUS erreicht viel mehr aktive OM's in Europa als z.B. eine Veroeffentlichung der UKW Berichte.

DX EXPEDITIONEN

DF1EQ reports that F6CRP/p will be qrv in the first week of September from QTH YG29. On 3rd and 4th they will be active only on 2m and 1st,2nd,5th as 6th and 8th Sept. on 70 and 23cm. tks fer info

Mike, F1FLN writes: Following information for DX Expedition in August 1983: QTH Loc. "ZC". (Op. F1FLN, F1DDA, F1FVP, F1GHU, a.o.). Call: F1KBF/p. QRV 2m: 4 x 13 el for tropo, 2 x 17 el. for MS. PWR 1.5 kW, preamp: 3SK97. (During the Persides also qrv on VHF net). 70cm: 4 x 21 el. PWR 500W, preamp: MGF1400. 23cm: 4 x 23 el. PWR 150W, preamp. MGF1400. Only SSB skeds. QRV from 5th Aug. - 18th Aug. For more detailed information write to: Michel Rousselet, F1FLN, 35 rue Cauchy, F-94110 Avcenl, FRANCE. tks for info, Michel

Expedition to "IP" Square: The club-station SK7OA/mm will be qrv from P-square during the Region 1 VHF Contest 3-4. Sept. 1983 (if the eather and wind is o.k.). We shall operate from an old scout-boat alled "Sarpen". Operation will be in both SSB and CW. QSL via bureau r direct to SK7OA (Sydkustens Radioamatoerer) P.O.Box 92, S-270 12 ydsgard, SWEDEN. tks fer info, Chris

G8ROU, David writes: I enclose information of our expedition to XM80f n August 1983 . Members of the group: G8PNM, G8RDJ, G8ROU, G6ABU and 6DNT. Operating period:6.8.83 - 20.8.83. Working condx: 144 MHz 2 x 17 1, 2 x 4CX250B linear-400W, TS700, 3SK88 preamp. 432 MHz: 4 x 21 el., C39 linear 100W, FT221R + transverter, MGF1400 preamp. 1296 MHz: 4 x 5 over 15 el., 2 x 2C39 linear 100W, FT221R + transverter, MGF1400. perating Mode: Mainly SSB. CW operation may be possible if operators vailable. On 144 MHz the period 10.8. - 15.8. will be reserved for eteor Scatter work. Tropo used at other times. Operation frequencies: 44 MHz: 144.225 MHz (Tropo). 144.440 MHz (MS). 432 MHz: 432.225 MHz nd 23cm 1296.225 MHz. When no QSO's are taking place we will monitor he calling frequencies in use in U.K. on each band. (144.300 MHz, 32.200 MHz, 1296.200 MHz). Skeds may be made through any of these tations. A station may be qrv on the VHF net 14.345 MHz operators ermitting. Callsigns: 144 MHz SSB GW6APZ/p, other callsigns to be onfirmed. Skeds and other information can be obtained from myself at he below adress. David Hardy, G8ROU, Thorntree House, Wenesly, latlock, Derbyshire DE4 2LL, England. tks fer info David

Contest Informations

XXXV. POLNI DEN 1983. The Central Radio Club of Czechoslovakia has he honour to invite radio amateurs to participate in the jubilee XXXV. OLNI DEN /field day/ VHF, UHF, SHF Contest/ which will take place luring the third subregional contest. Contest period: 24 hours from 400 GMT July 2nd 1983 to 1400 GMT July 3rd 1983. Classifications: ortable qth only: 1.) 145 MHz max. Outp. 5W fully transistorized quipment fed from the chemical or solar sources / battery storage attery etc. 2.) 145 MHz, Outp. according to the licensing rules. 3.) 33 MHz, max. Outp. 5W, fully transistorized equipment fed from the hemical or solar sources / battery / storage battery etc. 4.) 433 MHz utp. according to the licensing rules. 5.). 1296 MHz Outp. according o licensing rules. 6.) 2304 MHz Outp. according to licensing rules. xcange: RS or RST report + a progressive qso-number starting with 001 nd QTH locator. The contacts made via active repeaters are not valid. oints: each one km of the qso distance counts one point. Logs: Use a separate log for each band. Log must contain all necessary data / lease keep all times in GMT / plus total score and the declaration hat the rules and regulations of the contest have been observed. Logs ust be sent no later than July 18th, 1983. Mailing adress: The Central adio Club, Vlnita 33, 147 00 PRAHA 4, Czechoslovakia. The decesions of he Contest Commitee are final. Jan , OK1VAM, Award manager.

Skeds

F1ELL, BI02h, qrv 2m 800W, 4x16el, nf.7dB: 70cm 300W, 4x21el, nf=.6dB: 23cm 150W, 4x23el, nf=1dB. For skeds write to: Robert Monceau, 24 rue de Vercors, F-95100 Argenteuil, FRANCE

G8TZT/p writes...a group of us here often go to YO square and hope shortly to be qrv on 70 and 23 cm. tks for info, Chris

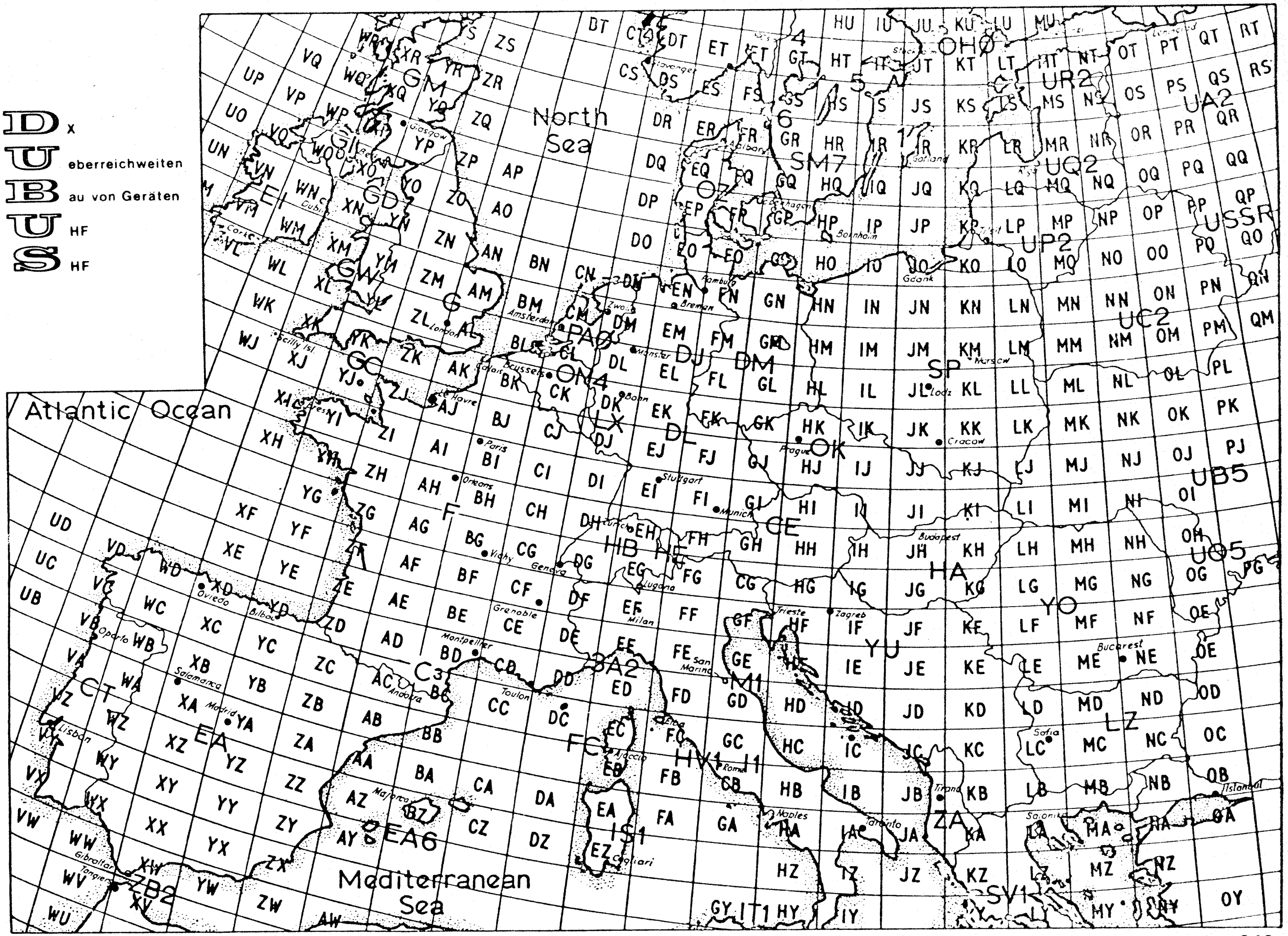
RUSSIAN PHONETICS

1980-02-29
SM5AGM

ICAO PHONETIC	ENG CHA	CODE	RUS CHA	MOST POPULAR RUSSIAN PHONETICS	PRONUNCIATION WITH LATIN SPELLING (+ Ш=SH Ч=CH Щ=SHCH Ж=ZH)
ZERO	0	-----	0	НОЛЬ НУЛЬ	NOL NUL
ONE	1	·----	1	ОДИН ЕДИНИЦА ПЕРВЫЙ	ADJÍN JIDINÍTSA PJÉRVYJ
TWO	2	··---	2	ДВА ДВОЙКА ВТОРОЙ	DVA DVÓJKA FTARÓJ
THREE	3	···--	3	ТРИ ТРОЙКА ТРЕТИЙ	TRI TRÓJKA TRÉTI
FOUR	4	····-	4	ЧЕТЫРЕ ЧЕТВЁРКА ЧЕТВЁРТЫЙ	CHITÝRI CHITVJÓRKA CHITVJÓRTYJ
FIVE	5	·····	5	ПЯТЬ ПЯТЁРКА ПЯТЫЙ	PJAT PITJÓRKA PJÁTYJ
SIX	6	-····	6	ШЕСТЬ ШЕСТЁРКА ШЕСТОЙ	SHEST SHESTJÓRKA SHESTÓJ
SEVEN	7	--···	7	СЕМЬ СЕМЁРКА СЕДЬМОЙ	SJEM SIMJÓRKA SIDMÓJ
EIGHT	8	---··	8	ВОСЕМЬ ВОСЬМЁРКА ВОСЬМОЙ	VÓSIM VASMJÓRKA VASMÓJ
NINE	9	----·	9	ДЕВЯТЬ ДЕВЯТКА ДЕВЯТЫЙ	DJÉVIT DIVJÁTKA DIVJÁTYJ
ALFA	A	·-	А	АННА АНТОН	ÁNNA ANTÓN
BRAVO	B	-···	Б	БОРИС БОРЯ	BARÍS BÓRI
CHARLIE	C	-·-·	Ц	ЦЕНТР ЦЕНТРАЛЬНЫЙ	TSENTR TSENTRÁLNYJ
DELTA	D	-··	Д	ДИМИТРИЙ ДИМА	DIMÍTRI DÍMA
ECHO	E	·	Е	ЕЛЕНА	JILÉNA
FOXTROT	F	··-·	Ф	ФЁДОР	FJÓDER
GOLF	G	--·	Г	ГРИГОРИЙ ГАЛИНА	GRIGÓRI GALÍNA
HOTEL	H	····	Х	ХАРИТОН	HARITÓN
INDIA	I	··	И	ИВАН	IVÁN
JULIET	J	·---	Й	ИВАНКРАТКИЙ ЙОД	IVANKRÁTKI JOT
KILO	K	-·-	К	КИЛОВАТ КОСТЯ КОЛЛЕКТИВНАЯ	KILAVÁT KÓSTI KALLEKTÍVNAJA
LIMA	L	·-··	Л	ЛЕОНИД	LIANJÍD
MIKE	M	--	М	МАРИЯ МИХАИЛ	MARÍA MIHAÍL
NOVEMBER	N	-·	Н	НИКОЛАЙ	NIKALÁJ
OSCAR	O	---	О	ОЛЬГА	ÓLGA
PAPA	P	·--·	П	ПАВЕЛ	PÁVIL
QUEBEC	Ø	--·-	Щ	ЩУКА	SHCHÚKA
ROMEO	R	·-·	Р	РОМАН РАДИО	RAMÁN RÁDIO
SIERRA	S	···	С	СЕРГЕЙ СЕРЁЖА САША	SIRGÉJ SIRJÓZHA SÁSHA
TANGO	T	-	Т	ТАМАРА ТАТЬЯНА	TAMÁRA TATJÁNA
UNIFORM	U	··-	У	УЛЬЯНА	ULJÁNA
VICTOR	V	···-	Ж	ЖЕНЯ ЖУК	ZHÉNJA ZHUK
WHISKEY	W	·--	В	ВАСИЛИЙ ВИКТОР	VASÍLI VÍKTER
X-RAY	X	-··-	Ь	ЗНАК МЯГКИЙЗНАК	ZNAK MJÁHKIZNAK
YANKEE	Y	-·--	Ы	ИГРЕК	ÍGRIK
ZULU	Z	--··	З	ЗИНАИДА	ZINAÍDA
			Ё		
		---·	Ч		
		----	Ш		
			Ъ		
		··-··	Э		
		··--	Ю		
		·-·-	Я		

EXAMPLE: A STATION SAYING HAS THE CALL-SIGN UK6XVZ — ULJÁNA KALLEKTÍVNAJA SHEST ZNAK ZHÉNJA ZINAÍDA

Dx
Ueberreichweiten
Bau von Geräten
UHF
SHF



EUROPEAN VHF TOP LIST 144 MHZ

1. JUNE 1983

NR	CALL	QTH	WKD	TROPO	AURO	MS	ES
1	Y22ME	HM	420	1577	1579	2293	2157*
2	DK6AS	FM	418	1460	1885	2510	2260*
3	SM7AED	GQ	411	1522	1600	2274	2186
4	SM7FJE	GQ	407	1642	1600	2241	1761
5	PA0RDY	CM	374	1499	1959	2262	2295
6	DK5AI	FL	369	1565	1510	2275	2282
7	F6CJG/P	BF	357	1748	1892	2510	2836
8	SM5CHK	HS	350	1262	1753	1991	2060
9	UA3LBO	QD	347	1807	1939	2273	2467*
10	DF3XU	FN	332	1643	1808	2106	2222
11	SM5BEI	JU	331	1525	1777	2702	2455
12	PA0ODM	DN	328	1405	1986	2310	2215
13	SM0FFS	JT	327	1820	1580	2030	2190
14	DZ1FDH	GP	327	1581	1762	2271	2287
15	DJ5MS	GI	323	1260	1509	2102	1930
16	SM4IVE	HT	322	950	1940	2026	2122
17	DL1MF	GH	321	1530	1512	2085	1899
18	OZ1EYX	GQ	318	1420	1602	1839	2382
19	OH7PI	NW	316	1902	1715	2151	2272*
20	I6WJB	HC	315	2224	1500	2214	2374
21	DK1KO	FN	315	1625	1745	2124	2194
22	HG1YA	IH	314	1612	1534	2183	2885
23	SP2DX	JO	313	1464	1730	2337	----
24	PA2VST	CM	313	1459	1803	2572	2221
25	OK1KKH/P	HJ	309	1370	1518	2082	2146
26	DK3UZ	EN	308	2131	1910	2021	3100
27	OZ9FW	GP	305	1328	1618	1954	1963
28	UR2RQT	MS	302	1210	1840	2172	1900
29	OZ1EKI	EP	301	1450	1777	2088	2273
30	DK4TG	DL	301	1410	1730	2440	2000
31	DL4EA	DL	300	1468	1723	2078	2247
32	OK3AU	KI	296	1608	1637	2065	2236
33	DL70Y	GM	293	1402	1751	2353	1845
34	SM0HAX	JT	290	1700	1640	1650	2240
35	UR2EQ	NT	288	1541	1840	2240	2245
36	SM7GWU	HS	287	1585	1770	2099	2007
37	I4BXN	FE	279	1600	1520	1916	2670
38	G3FOI	AL	278	1500	1566	2113	2000
39	Y23FG	FM	277	1560	1375	2010	2082
40	PA3BIY	CM	276	1480	1850	2000	2296
41	F6DWG	BJ	276	1400	1613	2143	2448
42	DF6NA	EJ	276	1156	1120	2080	1709
43	I3LGP	GF	275	1000	1387	2020	3150
44	I3TJQ	GF	275	1000	1250	1950	3120
45	G3NSM	ZL	272	1489	1667	1872	2231
46	LA2PT	FT	272	1438	1660	2020	2427
47	OZ1DOQ	GP	272	1353	1590	1879	2260
48	SM5CUI	IT	271	1590	1600	2190	----
49	PA0FTF	CK	270	1500	1800	----	2900
50	ON5QW	BL	270	1430	1625	2080	2150
51	UB5JIN	RE	269	1709	1497	2500	2826*
52	YO2IS	KF	269	1380	1775	2040	2360
53	Y23ZI	FL	268	1785	1280	1925	2075
54	SM3BIU	HX	268	1460	1890	2260	2250
55	YU2IQ	HE	268	1210	----	1955	3462
56	YZ1PL	GL	266	1760	1360	2110	1960
57	SP5JC	KM	266	1740	1740	1980	1861
58	DF1OH	EM	266	1564	1671	2242	1961
59	PA0KDV	DN	265	1475	1610	2051	2236
60	OH3TH	LV	265	1355	1669	2217	2069+
61	UQ2GFZ	NR	265	1154	1855	1884	2159
62	DK2PR	EN	264	1445	1515	1940	2425
63	SM4COK	HT	261	1440	1570	2080	1940
64	SM7WT	GP	260	1590	1680	1930	2180
65	I4EAT	FE	260	1550	1420	2240	2500
66	PA0WWM	CM	260	1303	1839	1997	2212
67	G4DSC	ZO	259	1485	1485	1942	2285
68	DK1PZ	FL	257	1567	1364	1867	1866
69	OH2BBF	LT	257	1388	2000	2125	2144
70	OZ1FTU	FP	257	1282	1558	1903	2315
71	EA3LL	AB	256	1995	----	2155	3215
72	DJ9CZ	DL	256	1650	1862	1925	2015
73	SM2CKR	KX	256	1630	1660	2310	1810
74	SM3AKW	JW	256	1598	2078	2142	2504
75	F6BSJ	CG	256	1510	1220	2105	2705
76	UR2GZ	MS	253	1577	1794	2141	2174
77	YU3ES	GF	251	1167	1004	2074	2483
78	YU1EU	KE	250	1680	----	2200	2380
79	DF1JC	DL	249	1270	1830	2348	2007
80	LX1GR	DJ	249	868	1104	2206	1409
81	F1FHI	ZH	248	1739	1292	2125	2467
82	OE3XUA	HH	248	1610	1240	2160	1785
83	SM5DRV	HR	248	1330	1410	1810	----
84	YU7EW	KF	246	1868	1172	1930	2425

NR	CALL	QTH	WKD	TROPO	AURO	MS	ES
85	SM0DJW	IS	246	1340	1810	1840	2166
86	HG8ET	KG	245	1445	1845	2000	2274
87	F8OP	CG	242	1228	1196	2028	2720
88	ON4YZ	CK	241	1530	1510	----	2110
89	PA3AOU	DM	241	1392	1673	1763	2193
90	ON6UG	BL	241	1089	1013	2640	3296
91	OZ6OL	FF	239	1800	1700	----	1800
92	G4IGO	YL	239	1358	1770	1956	2198
93	SM4AXY	HT	238	1714	1760	1880	1960
94	OZ8SL	GP	238	1476	1305	----	2188
95	SM7GEP	HR	238	1467	1768	1695	2043
96	OH0JN	JU	238	1451	1856	2108	2198
97	YU7BCX	KF	237	1868	1172	1956	2425
98	SM3DCX	IV	237	1300	1850	1990	----
99	RQ2GAG	MQ	236	1432	1714	----	1973
100	PA3BBA	CM	236	1300	1436	1907	2311
101	UA3TCF	WQ	236	1131	1974	2498	2332
102	UA3MBJ	SS	235	1560	2006	2573	2390
103	DF6DB	FM	234	1421	1349	1877	2013
104	SM5BSZ	JT	233	1830	1720	1890	2080
105	DL7ZL	GM	232	1401	1254	3200	3800
106	SM5FRH	HT	231	1580	1690	1650	----
107	SM4GGC	GT	231	1286	1815	1856	1670
108	OZ3IW	FO	230	1763	1863	1415	1958
109	OZ1CLL	GF	230	1369	1969	1448	2208
110	SM5CNQ	HS	228	1698	1751	1909	1843
111	OK1FM	GJ	226	1843	1438	2200	1827
112	SM3COL	IW	226	1784	1693	2122	2367
113	F6CTW	BI	226	1677	1714	2230	2420
114	SM6CKU	GR	225	1530	1560	1470	1790
115	YU3CAB	HG	225	1463	1530	2165	3356
116	SM3UL	IV	225	1275	1521	2110	2363
117	G8FUF	AL	224	1810	1410	2466	1600
118	PA0HWM	CK	224	1268	1508	1845	3103
119	GJ4ICD	YJ	223	1620	1100	2050	2090
120	UQ2GLO	KQ	223	1447	1802	1992	1576
121	DK8VS	DJ	223	1350	1080	2240	3220
122	G3CHN	YK	222	2656	2138	----	2358
123	SM0IOT	JT	218	1300	1700	1820	2100
124	DF2IC	DK	218	1090	1686	2004	2009
125	UC2AAB	NN	217	1350	1850	1980	2280
126	Y240D	GM	215	1250	960	1846	1840
127	DL7YW	GM	213	1299	1106	1895	2170
128	SM5EJN	IT	212	1770	1630	2240	1920
129	SM5AQJ	JT	212	1380	1580	1930	----
130	DK3XT	FN	211	1350	1430	1800	1990
131	YU2KDE	JF	209	1731	1097	2074	2196
132	SM5CNF	HS	208	1660	1730	1850	----
133	DF5DL	EL	208	1389	1596	2003	2020
134	PA0XMA	DM	208	1285	1330	2300	1930
135	I1DMF	DF	208	1001	930	1864	2718
136	LA9BM	EU	207	1612	1670	1892	2165
137	SM0BYC	IT	207	1380	1710	1890	2390
138	OZ3BW	FO	207	1340	1580	----	2338
139	YU1EV	KE	206	1650	----	2165	2200
140	F6CEK	BI	206	1500	1350	1700	2300
141	PA3BSK	DL	206	1387	1698	1290	2148
142	I4XCC	GD	205	1070	1782	2275	2270
143	Y59UN	GK	204	1790	1220	1920	1630
144	OK1MBS	HK	204	1465	1470	1371	2133
145	SM4ARQ	HT	202	1750	1590	1950	1930
146	UQ2GCG	LR	202	1676	1769	1990	1769
147	PA2CHR	CL	202	1370	1108	1695	2137
148	Y23PA	GO	202	1168	1150	1710	----
149	PA3GER	CL	201	1327	1249	2100	2118
150	DK2LM	EJ	201	1014	1098	1956	1981
151	SM3FGL	IV	200	1563	1680	1955	----
152	LA8AK	DS	200	1325	1722	1797	----
153	OZ1ASL	FO	199	1339	1675	1680	2323
154	Y24TN	GK	195	1790	1310	1920	1630
155	OE5JFL	GI	193	1503	1155	1964	1823
156	HG5KDD	JH	192	1307	----	1849	2155
157	SM5AGM	JT	191	1930	1740	----	2000
158	OK1KHI/P	HK	191	1635	1156	----	----
159	PA0BAT	DL	191	1078	1377	2498	2042
160	UR2RDR	MS	189	1200	1750	1600	2100
161	DL7AN	GM	188	1310	1140	1936	1845
162	PA3AHD	CM	188	1279	1586	1940	1879
163	UQ2NX	MR	187	1712	1745	1707	1870
164	DK3LL	FO	187	1525	1187	1875	1812
165	DL1JF	FO	185	1325	1775	----	2062
166	G3LQR	AM	184	1776	1772	2150	2077
167	SM4FXR	HT	184	1280	1430	1760	----
168	UQ2QW	MQ	182	1092	1514	1845	1963

DEADLINE IN 1983 (1)1.3 (2)1.6 (3)1.9 (4)1.12 WKD=NUMBER OF WORKED SQUARES *=EME OP. +=OP. HAS DIED PRINTED BY DL 7 QY

EUROPEAN UHF TOP LIST 432 MHZ 1. JUNE 1983

NR	CALL	QTH	WKD	TROPO	AURO
1	DL7QY	FJ	177	1368	1618*
2	DL7YC	GM	169	1225	----*
3	DK5AI	FL	166	1506	798*
4	DF3XU	FN	165	1607	1057
5	DL7ZL	GM	155	1305	1249*
6	SM3AKW	JW	151	1190	919*
7	OZ7IS	GP	149	1387	1000
8	UA3LBO	QO	138	1426	1612*
9	PA0EZ	CM	132	1310	1028
10	F1FHI	ZH	130	1892	----
11	SM6CKU	GR	129	1293	660
12	DK6AS	FM	127	1360	620*
13	DJ9DL	DL	126	1274	615*
14	G3LQR	AM	125	1471	873*
15	OZ9FW	GP	125	1348	1026
16	PA0FRE	CL	122	1400	815
17	Y22ME	HM	121	1285	874
18	OK1CA/P	HK	120	1267	----
19	DB6BX	DM	119	1398	----
20	PA0WWM	CM	119	1342	726
21	DB6NT	FK	116	1505	----
22	PE0AGO	DM	116	1382	----
23	Y23FG	FM	115	1560	680
24	DL3UZ	FN	114	1270	----
25	OK1AIB/P	HK	113	1267	----
26	SM7BAE	GP	113	1220	850*
27	OH3TH	LV	113	1199	943+
28	DK0NA	FK	112	1096	----
29	SM5BEI	JU	110	1325	1016
30	DF3EE	DL	110	1267	1019
31	SM5CPD	IT	110	1230	640
32	ON5FF	BL	110	1170	736
33	OH0NC	KU	109	1545	920
34	SM5DWC	IT	109	1400	810
35	SM0FFS	JT	109	1380	740
36	PE1CQQ	DM	108	1356	490
37	SM0FZH	JT	106	1900	957
38	OZ2GE	EP	106	1432	750
39	F6GNR	ZH	105	1894	----
40	SM6FYU	GQ	105	1441	706
41	DL4EA	DL	105	1265	1009
42	DJ6MB	DK	103	1253	921
43	OK1KHI/P	HK	102	1424	----
44	GJ4ICD	YJ	102	1340	803
45	DK2NH	FN	101	1607	805
46	SM0DFP	IT	101	1410	830
47	OK1KIR/P	GK	101	1331	----*
48	DL7APV	GM	100	1308	850*
49	DC7QH	GM	100	1231	509
50	DL7AN	GM	99	1240	----
51	DB2VY	DJ	96	1335	----
52	DC9CSA	GM	96	1171	----+
53	PA3AOH	DL	96	1054	530
54	G3COJ	ZL	95	1465	812
55	OZ7LX	FP	93	1315	720
56	PA3BSK	DL	93	1129	----
57	DK1PZ	FL	93	1018	----
58	OK1AIY/P	HK	92	1351	----
59	PA2DOL	CL	92	1088	----
60	G8KBQ	YL	91	1327	----
61	SM0DYE	JT	91	1205	845
62	F9FT	CJ	90	960	----
63	PA0JOZ	CM	89	1156	----
64	SM6HYG	FS	87	1410	600
65	DD2EK	DL	86	1284	----
66	G3UBX	YM	86	1101	----
67	G3PBV	YK	85	1572	----
68	Y23PA	GO	85	1102	----
69	OZ3GW	FQ	85	1090	620
70	F1BUU	ZE	84	1250	----
71	OZ3ZW	FO	84	1237	613
72	Y22HA	GO	83	1414	----
73	F6CER	BI	83	1350	500
74	DF1OH	EM	83	1261	1038
75	DL6NAQ	EK	83	1253	----
76	ON5GF	CK	83	1115	----
77	ON7HP	??	83	799	----
78	DL7ACG	GM	79	1279	----
79	ON4YZ	CK	78	1460	----
80	DF1JC	DL	78	1270	----
81	DK2ZF	FN	78	1223	----
82	DB5AQ	FL	78	1050	----
83	PA0VV	CM	77	1180	----
84	DB1NZ	FJ	77	1146	----
85	DJ7YP	EM	77	971	----
86	DL5FAU	EK	76	1120	----
87	DF7VX	EL	76	1105	658
88	Y22EN	GK	75	1395	----
89	PA2DRV	CL	75	1147	----
90	OZ1EKI	EP	75	1044	527
91	DJ6XV	DL	75	927	508
92	DL6WU	EJ	74	1305	740*
93	DL7HR	FI	74	1256	980
94	DC9BU/A	EK	74	1253	----
95	OE3XUA	HH	74	1215	----
96	OH2BBF	LT	74	1164	773
97	SM4IAZ	HT	73	1055	1134
98	SM7GEP	HR	72	1428	533
99	G4LRT	ZM	72	1394	----
100	Y23BD	GM	72	1150	----
101	DF2YQ	DL	72	1077	475
102	G8HVY	YK	71	1500	----
103	G4BEL	AM	71	1175	----
104	UR2EQ	NT	71	1160	907
105	SM5CUI	IT	71	1150	1260
106	Y24BO	GM	71	1066	838
107	SM0CPA	IT	71	1060	800
108	SM7CFE	HQ	70	1420	----
109	PA3BGL	CN	70	1250	----
110	SM5CUL	IT	68	1150	1260
111	Y24QO	GM	68	1100	----
112	DF5JJ	DL	67	895	----
113	DG4GAN	EI	66	1504	----
114	SM7GWU	HS	66	1192	628
115	PA2CHR	CL	65	1265	----
116	OZ9SW	EQ	65	1050	----
117	SM7FMD	HR	64	1594	----
118	DG4BB	EN	64	1194	----
119	G3WSN	AL	63	1385	----
120	DL0SP/P	GM	63	1150	----
121	DF6NA	EJ	63	1102	----
122	PE1HWO	CL	63	1050	----
123	RQ2GAG	MQ	62	1317	709
124	LA8AK	DS	62	1188	748
125	UP2BBC	LP	62	1125	807
126	SP9FG	JJ	61	1327	----
127	F6CJG/P	BF	61	1170	----
128	DK3OL	DL	61	909	----
129	SM5DSN	IT	60	1470	670
130	OK1KTL/P	GK	60	993	----
131	ON6UG	BL	60	970	420
132	DK8VS	DJ	60	920	----
133	SM5LE	JT	59	1560	710
134	G8SFM	YL	59	1255	----
135	DL7RU	GM	59	1231	----
136	DC4XH	EN	59	1037	----
137	HB9AOF	DG	59	820	----
138	DK0IK	EN	59	752	----
139	F6HLD/P	CG	58	1545	----
140	DF3CK	FH	58	1144	867
141	PE0DOL	CL	58	1033	----
142	DL4OL	FM	57	1018	----
143	DF1EQ	DL	57	811	----
144	DC9XO	EM	56	1169	----
145	I6GQA	GD	56	813	----
146	DK3UC	FN	55	1380	600
147	G4MUT	ZL	54	1197	----
148	HB9MIN/P	DH	54	1100	----
149	PA0JME	CL	54	1046	----
150	PA0XMA	DM	54	980	485
151	PA2HJS	CK	54	832	----
152	DK1KO	FN	53	920	----
153	IW5AFB	FC	53	738	----
154	PA0JTA	CL	52	920	----
155	DL0SO/A	DL	52	888	----
156	SM4AXY	HT	51	1330	550
157	DF7YU	EL	50	1147	----
158	G4MCU	AL	50	1071	----
159	SM6FHZ	GQ	50	1010	800
160	SM3IVE	HT	50	938	703
161	HB9QQ	EH	49	1080	----
162	PA3BBA	CM	49	1028	----
163	Y21PL	GL	49	828	----
164	YU3CAB	HG	49	684	----
165	SP1DSU	HN	48	1340	730
166	UR2NW	LT	48	1060	675
167	DD3KF	DK	47	862	----
168	SP5JC	KM	46	1120	866
169	UR2RQT	MS	46	853	853
170	UQ2NX	MR	45	1355	----
171	G4FRE	AL	45	1140	----
172	DL2OM	DK	45	780	639
173	SM3COL	IW	45	621	455
174	OE3PQU	HI	44	1120	----
175	OZ1FDH	GP	44	1033	822
176	F6ECI	BI	44	880	----
177	I2FUM/2	EE	44	875	----
178	DL2HAD	EN	44	798	----
179	SM2CKR	KX	43	1215	820
180	DF3XZ	FN	43	956	----
181	DC8LG	FH	43	934	----
182	DC9VA	DJ	43	920	----
183	DC7OH	GM	42	1079	----
184	SM0AGP	IT	42	740	410
185	IW5AVM	FC	41	1458	----
186	SM4DHN	GU	41	1240	1030
187	UQ2OW	MQ	40	934	833
188	DL7WC	GM	40	795	----
189	G8ROU	ZN	39	1255	----
190	DL9HN	FN	39	1093	----
191	GM3ZSS	YR	38	1400	----
192	UQ2GFZ	NR	38	1328	590
193	HB9MIO/P	DH	38	1010	----
194	DK0IK/P	DO	38	800	----
195	DL0UL/P	EI	38	676	----
196	HG1YA	IH	38	631	----
197	OE5XPL	HI	37	1176	----
198	DL8DAU	DL	37	737	----
199	F6BSJ	CG	36	1525	----
200	UA3MBJ	SS	36	1200	800
201	HG2KML	JH	36	600	----
202	UR2AO	MT	35	1131	----
203	UR2GZ	MS	35	1035	----
204	DL9DAK	DL	35	824	----
205	UR2RGM	MT	35	820	----
206	DG5BQ	EN	35	739	----
207	DL7YW	GM	35	724	----
208	YU3USB/3	GG	35	632	----
209	ON5QW	BL	34	960	----
210	I3IVN	FF	34	866	----
211	F6EAS	ZI	34	630	----
212	SM3UL	IV	34	585	674
213	OK1VAM	GK	34	511	----
214	DK2PR	EN	33	1200	----
215	SM3BIU	HX	33	920	720
216	DF1EO	DL	33	767	----
217	UR2RIW	LS	32	1100	----
218	DJ5LZ	FI	32	931	----
219	DB9SB	EJ	32	853	----
220	SM5EVK	IS	32	740	----
221	UR2RIC	LS	31	673	----
222	EA3LL	AB	30	1315	----
223	UQ2GCG	LR	30	1275	396
224	I2FHW	EE	30	700	----
225	OK3AU	KI	29	1172	----
226	DC7HF/A	EN	29	1001	----
227	DG7FZ	EK	29	922	----
228	OE1KTC	II	29	808	----
229	DB7NW/A	FK	29	649	----
230	YO2IS	KF	28	1020	----
231	G8MFJ	ZL	28	941	----
232	DF5BL	DM	28	616	----
233	OZ1CFO	ER	27	779	----
234	OH2BWL	MU	26	1220	980
235	DK5OD	EM	26	1023	----
236	UR2QA	NS	26	803	----
237	DB6AV	EI	25	788	----
238	DH0FAB	EK	25	669	----
239	UR2JL	MT	25	405	----
240	UA3TCF	WQ	24	1131	903
241	DL0SZ	FI	24	931	----
242	DL4OJ	FM	22	1040	----
243	OE3PUW	II	22	495	----
244	UQ2AO	MQ	22	487	----
245	UR2QY	LT	21	650	----
246	DK0MB/P	EM	21	514	----
247	OY7O	WW	19	1560	----
248	DF2CA	EN	19	680	----
249	OE3RRA	II	18	890	----
250	OE3CEW	II	17	562	----
251	OE1WEB	II	12	600	----
252	OE1APS	II	12	497	----

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EUROPEAN SHF TOP LIST 1296 MHZ 1. JUNE 1983

1	PE1CHQ	DM	79	1200	32	F6CER	BI	43	1350	63	DG4BB	EN	27	741
2	PA0EZ	CM	78	1261	33	DL7YC	GM	42	1040	64	LA8AK	DS	26	900
3	DF3XU	FN	74	1277	34	HB9RG	EH	42	820	65	DF3CK	FH	26	899
4	G3LQR	AM	72	1232	35	DK2NH	FN	42	805	66	DL7ZL	GM	25	1112
5	PA0FRE	CL	70	1337	36	DK5AI	FL	41	868	67	UR2EQ	NT	25	588
6	PA0WWM	CM	70	1298	37	DF1EQ	DL	41	762	68	PA0VV	CM	24	622
7	PE0AGO	DM	70	1196	38	PA2DRV	CL	40	1314	69	SM5CPD	IT	24	610
8	DL7QY	FJ	65	1261	39	DC7QH	GM	38	1216	70	I2FUM/2	EE	22	972
9	HB9AMH/P	DH	64	1264	40	DL5FAU	EK	38	740	71	PA0JME	CL	22	867
10	PA2DOL	CL	62	1027	41	SM5DWC	IT	37	1060	72	DF1EO	DL	22	756
11	DB6NT	FK	61	1105	42	PA3BSK	DL	37	821	73	I3ZVN	FF	20	972
12	G4BYV	AM	61	1027	43	SM6ESG	GR	36	980	74	OK1AIB/P	HK	20	656
13	DK3UC	FN	60	1223	44	SM0FFS	JT	35	1040	75	SM0DYE	JT	20	485
14	DK0NA	FK	59	1096	45	SM5BEI	JU	35	877	76	DL7AN	GM	19	814
15	OK1AIY/P	HK	55	1351	46	DK1PZ	FL	34	865	77	DK0IK/P	DO	19	758
16	OK1KIR/P	GK	55	1208	47	OZ3ZW	FO	34	798	78	DL9GU	EJ	19	678
17	OZ7IS	GP	55	1205	48	DL3NI	DL	33	724	79	PA3BGL	CN	18	1155
18	F1FHI	ZH	54	1345	49	DL0SO/A	DL	33	642	80	G3PBV	YK	18	996
19	ON5GF	CK	54	1010	50	LX1DU	CJ	32	600	81	SM0FZH	JT	18	780
20	DL4EA	DL	54	906	51	G4BEL	AM	31	1025	82	ON6UG	BL	17	700
21	DK6AS	FM	51	990	52	SM6HYG	FS	31	1018	83	OE3PQU	HI	17	530
22	DL6NAQ	EK	50	1253	53	G3COJ	ZL	31	963	84	OK1KTL/P	GK	17	467
23	DB6BX	DM	50	845	54	PA2HJS	CK	31	690	85	DL0UL/P	FH	17	307
24	OZ2OE	EP	49	985	55	DK0IK	EN	31	672	86	DG4GAN	EI	16	580
25	PE1CQQ	DM	47	1167	56	DF3EE	DL	30	752	87	HB9MIO/P	DH	15	675
26	DB2VY	DJ	46	783	57	DD2EK	DL	29	845	88	DF5JJ	DL	15	455
27	DC9BU/A	EK	45	1253	58	DC0DA	DL	29	738	89	SM3AKW	JW	14	808
28	G4LRT	ZM	45	1152	59	DL3NQ	EJ	29	730	90	DJ8QL	EJ	14	778
29	SM0DFP	IT	45	1057	60	DL7APV	GM	28	1023	91	I4XCC/6	GD	14	425
30	SM6CKU	GR	44	820	61	OK1CA/P	HK	28	656	92	F6HLD/P	CG	13	740
31	OH0NC	KU	43	1537	62	DJ6MB	DK	27	879	93	HB9AOF	DG	13	369

EUROPEAN SHF TOP LIST 2320 MHZ 1. JUNE 1983

1	PA0EZ	CM	31	779	15	PA0WWM	CM	13	523	29	SM6ESG	GR	8	880
2	PE0AGO	DM	27	730	16	DF1EQ	DL	13	461	30	DJ8QL	EJ	8	463
3	DL7QY	FJ	25	1018	17	DL3NI	DL	13	448	31	LX1DU	CJ	7	300
4	DB6NT	FK	24	529	18	DC0DA	DL	13	429	32	DF5QZ	DL	6	468
5	G4BYV	AM	22	1027	19	DC3QS	DM	13	419	33	DF3XU	FN	6	416
6	DK0NA	FK	22	527	20	DL7YC	GM	12	634	34	DB8NC	FK	6	405
7	G3LQR	AM	21	924	21	G4LRT	ZM	11	1022	35	DB2VY	DJ	5	339
8	OK1KIR/P	GK	21	866	22	PA2DRV	CL	11	776	36	I2CVC/2	FF	5	267
9	DL5FAU	EK	20	582	23	PE1CQQ	DM	11	485	37	OK1KTL/P	GK	5	235
10	PA0FRE	CL	19	864	24	PA0JGF	DM	11	444	38	DC8UG/P	DK	5	230
11	OK1AIY/P	HK	16	1027	25	DF3CK	FH	9	418	39	IW2ALW/1	DF	5	198
12	DL3NQ	EJ	16	595	26	PA2HJS	CK	9	388	40	I2ROM	EF	5	182
13	PA2DOL	CL	15	781	27	PA0JME	CL	9	262	41	I2SG	EF	5	182
14	DK3UC	FN	15	661	28	SM6HYG	FS	8	1018	42	I2FUM/2	EE	5	166

EUROPEAN SHF TOP LIST 3456 MHZ 1. JUNE 1983

1	DC0DA	DL	10	429	9	PA0JME	CL	5	220	17	PA2DRV	CL	2	123
2	DB6NT	FK	9	529	10	PA2HJS	CK	4	388	18	DF5JJ/P	DK	2	80
3	PA2DOL	CL	9	528	11	PA0JGF	DM	4	376	19	DK3UC	FN	2	63
4	DL3NQ	EJ	9	398	12	DF1EQ	DL	4	118	20	DB8NC	FK	2	60
5	DK0NA	FK	8	528	13	G4AGN/P	ZN	4	115	21	DJ6TA	DK	2	42
6	DL7QY	FJ	7	565	14	G4BYV	AM	3	464	22	G4LRT	ZM	1	26
7	G3LQR	AM	7	427	15	DF5QZ	DL	3	68	23	DL3NI	DL	1	19
8	DC3QS	DM	7	419	16	PE0AGO	DM	2	134	24	DD2EK	DL	1	10

EUROPEAN SHF TOP LIST 5760 MHZ 1. JUNE 1983

1	DB6NT	FK	6	528	5	HB9AJF	EH	3	217	9	G3LQR	AM	2	241
2	DL7QY	FJ	5	171	6	DB8NC	FK	3	59	10	F0GOH/P	DH	2	109
3	PA2DOL	CL	4	529	7	OK1WFE	IK	2	303	11	DJ7JF/P	DH	2	95
4	DK0NA	FK	4	528	8	OK1VAM/P	HK	2	303	12	DC0DA	DL	2	58

EUROPEAN SHF TOP LIST 10368 MHZ 1. JUNE 1983

1	I6ZAU	GD	17	832	15	I4AOR	FE	7	320	29	PA0JME	CL	4	220
2	I3CLZ/3	FF	13	571	16	I4ZTO/4	FE	7	290	30	DB6NT	FK	4	171
3	YU3JN/3	GF	13	563	17	PA0EZ	CM	7	262	31	DK7GN/P	EI	4	166
4	I4XCC/6	GD	12	563	18	DJ7FJ/P	DH	7	243	32	OE3XUA	HH	4	77
5	I4CHY/4	FE	11	633	19	PA2DOL	CL	7	217	33	SM0DFP	IT	4	60
6	I3ZJL/3	FF	11	572	20	HB9AJF	EH	7	204	34	OH2BWL	MU	4	57
7	IW4AKY	FE	11	570	21	DL7QY	FJ	7	171	35	ON6UG	BL	3	174
8	I4QIG/4	FE	11	440	22	I4FKD/4	FE	6	260	36	DG4BB	EN	3	132
9	YU3URI	HG	10	344	23	HB9MDP/P	EH	6	205	37	YU3CAB	HG	3	107
10	DJ4YJ/P	EH	9	358	24	F0GOH/P	DH	6	184	38	DF1EQ	DL	2	74
11	I4BER	FE	9	340	25	IW3QCV	GF	5	290	39	DL0SO/A	DL	2	65
12	YU3TAL	GF	9	322	26	G3LQR	AM	5	258	40	DF1EO/P	DL	2	63
13	I2BBH/2	EE	9	237	27	HB9MIO/P	DH	5	217	41	DJ6TA	DK	2	51
14	HB9MIN/P	DH	8	310	28	DL3NQ	EJ	5	113	42	OE1WEB	II	2	50

EUROPEAN SHF TOP LIST 24192 MHZ 1. JUNE 1983

1	DJ7FJ/P	EH	5	170	3	DJ4YJ/P	FH	2	243	5	DK0NA	FK	1	34
2	HB9MIN/P	DH	3	110	4	F0GOH/P	DH	2	89	6	DL7QY	FJ	1	13

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