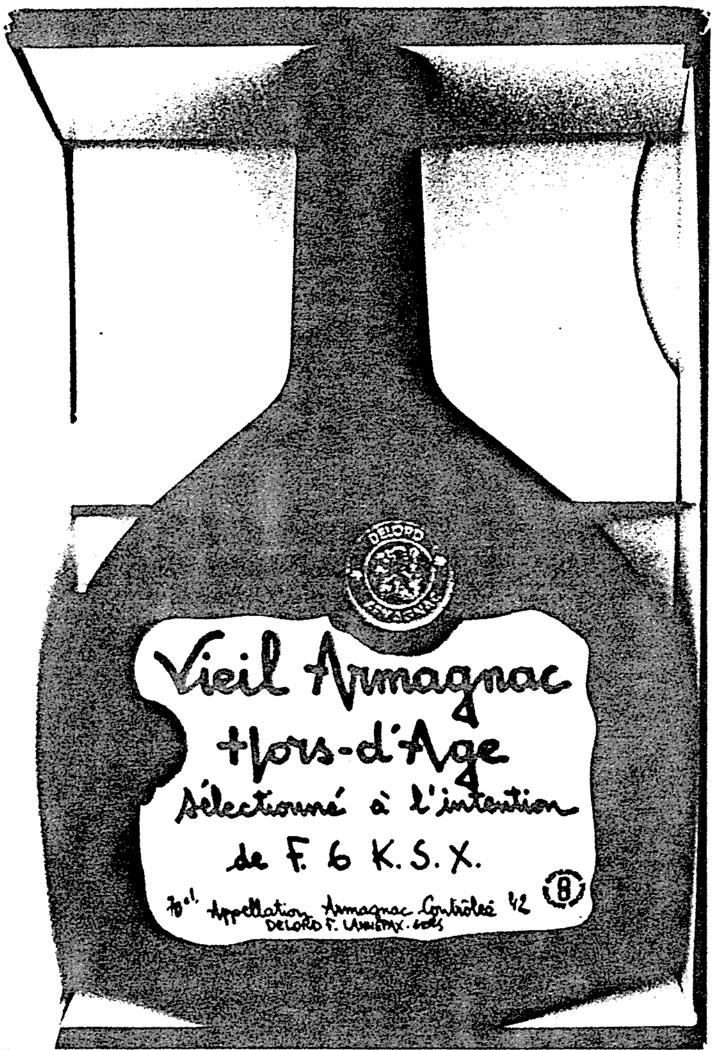
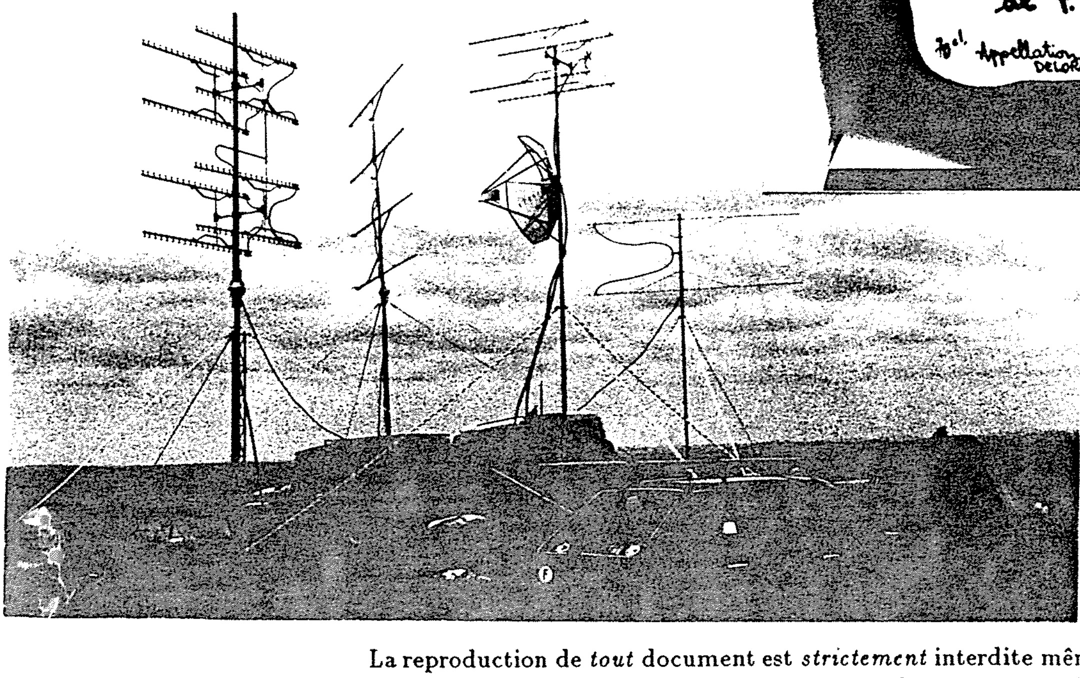
HURC INFOS

Nr30 FEVRIER 88





SHF-UHF-VHF /TRAFIC INFOS

A partir du contest de mars F1FHI sera de nouveau QRV sur 13cm et notamment RECEPTION (cw/ssb) sur la bande suisse 2308 MHz .

Il paraitrait que la joyeuse bande des suisses (HB9SAX,CVC,RDB etc) envisage une expedition en XH cet ete (juillet ?)

EDITO

Comme d'habitude personne n'a rien fait ! (mis a part Georges toujours aussi prolifique) Heureusement on a eu pas mal de littérature de DJ9BV ; d'autant plus que la version améliorée des antennes est arrivée alors que le bulletin était déja bien avancé - Si vous ne voulez pas que l'HURK ressemble toujours au prochain DUBUS il serait temps de vous reveiller !!

F1EIT _ fevrier 88

X-Element Yagi fuer 70 cm (Neufassung 1.9.86) *

DJ 9 BV 7/84

1. Design-Daten

Wellenlaenge (λ) : 694 mm (f = 432,0 MHz)
Elementlaengen,-abstaende : nach DL 6 WU berechnet

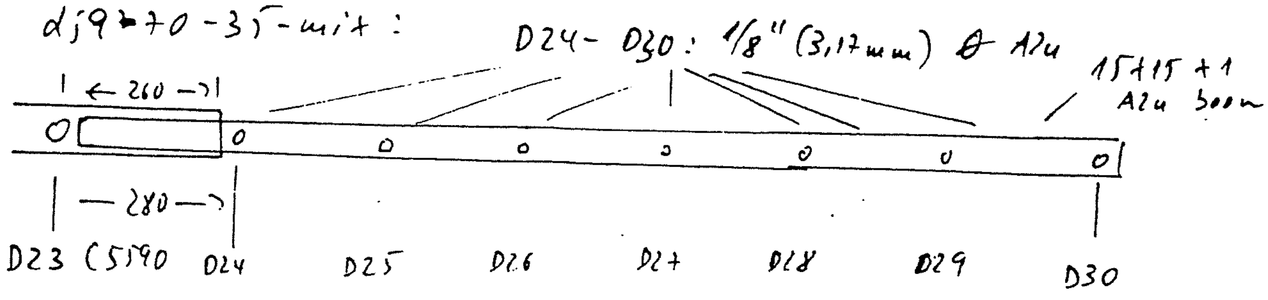
2. Mechanische Daten

Boom : 20x20x2 mm Al-Vierkantprofil (Square Alu boom)
Elemente : 4 mm Ø, Al-Rundstab (welding rod 4 Ø)
El.-Befestigung : Isoliert durch Nylon-Niete Heyman 61PR800000

Element	(Length) Laenge [mm]	VERSION 35El "Mix"	(Distance) Abstand [mm]	(Position) Position [mm]	Bemerkung
R1..R4	400		---	0	Vierfach-Ref.
R	340		---	0	Einfach-Ref.
S	325		130	130	8 mm Durchm.
D1	308		55	185	
D2	304		125	310	
D3	300		150	460	
D4	297		175	635	
D5	295		195	830	
D6	292		210	1040	
D7	289		220	1260	
D8	285		230	1490	
D9	285		240	1730	
D10	285		250	1980	
D11	281		260	2240	
D12	281		270	2510	
D13	281		280	2790	
D14	278		280	3070	
D15	278		280	3350	
D16	278		280	3630	
D17	275		280	3910	
D18	275		280	4190	
D19	275		280	4470	
D20	272		280	4750	
D21	272		280	5030	7,25 Lambda
D22	272		280	5310	
D23	270	3,17%	280	5590 *	+
D24	270	280	280	5870	8,5 Lambda *
D25	270	280	280	6150	
D26	267	280	280	6430	
D27	267	280	280	6710	
D28	267	278	280	6990	10 Lambda
D29	267	278	280	7270	
D30	264	278	280	7550	11 Lambda

* 29 El with 4er Reflector (Diagram)

\+ dj9bv70-35-mix :



X-Element Yagi fuer 70 cm DJ 9 BV 7/84

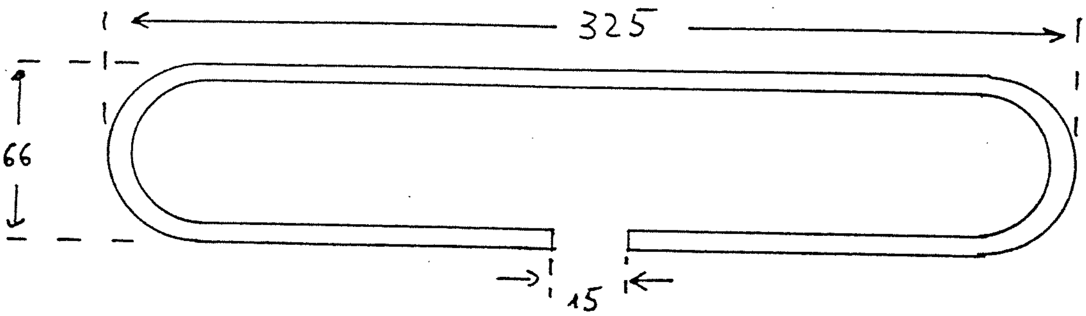
3. Aufbaudetails (Details)

3.1 Vierfach-Reflektor:
4-er Reflector

```
                                    * R1
                                    |
                                    |   150
                                    |
                                    * R2
                                    |
        ---*-----*-----*------      |   150
           D2    D1    S 130        |
                                    * R3
                                    |
                                    |   150
                                    |
                                    * R4
```

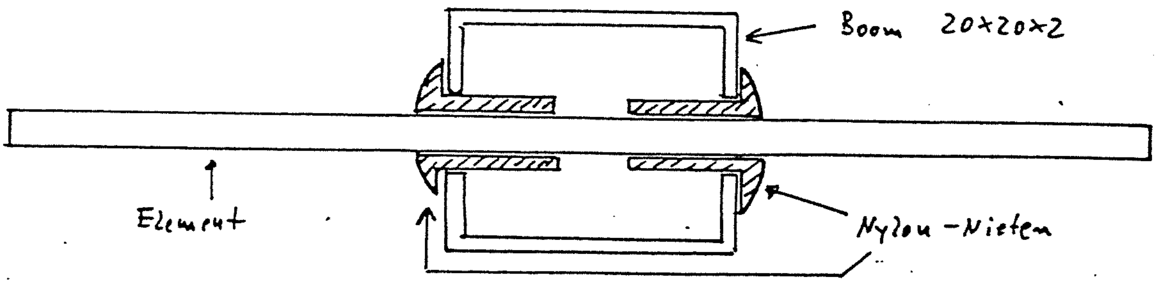
3.2 Dipol

Material: 8x1 Al-Rohr (Alu-Tube)
Balun : 240 mm RG142 B/U, Teflon-Kabel, 50 Ohm



3.3 Elementbefestigung (Isoliert, durch den Boom) (Isolated, through boom)

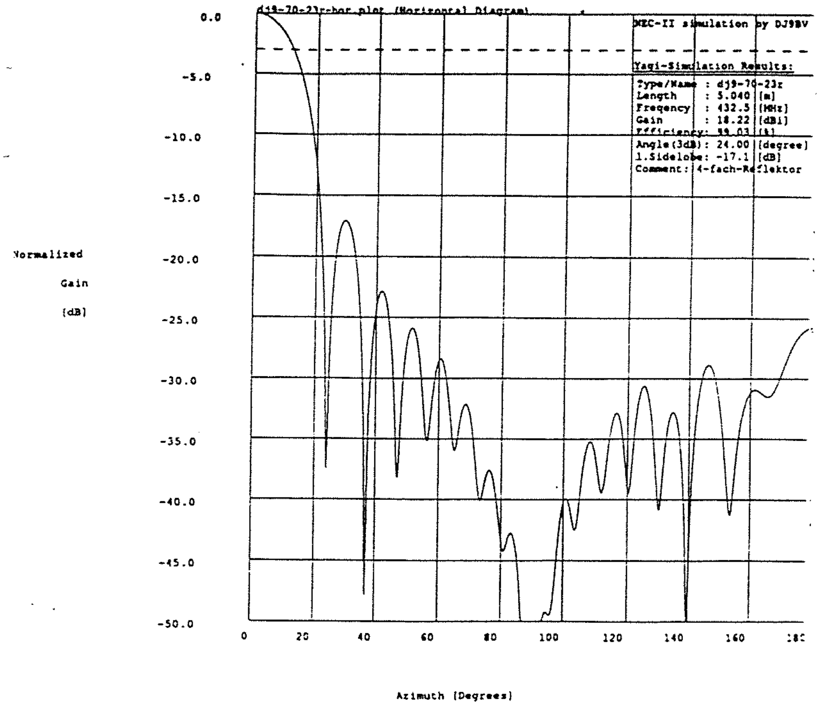
Elementhalter: Nylon-Niete Heymann 61PR800000
Elemente : Aluminiumstab, 4 mm Durchmesser

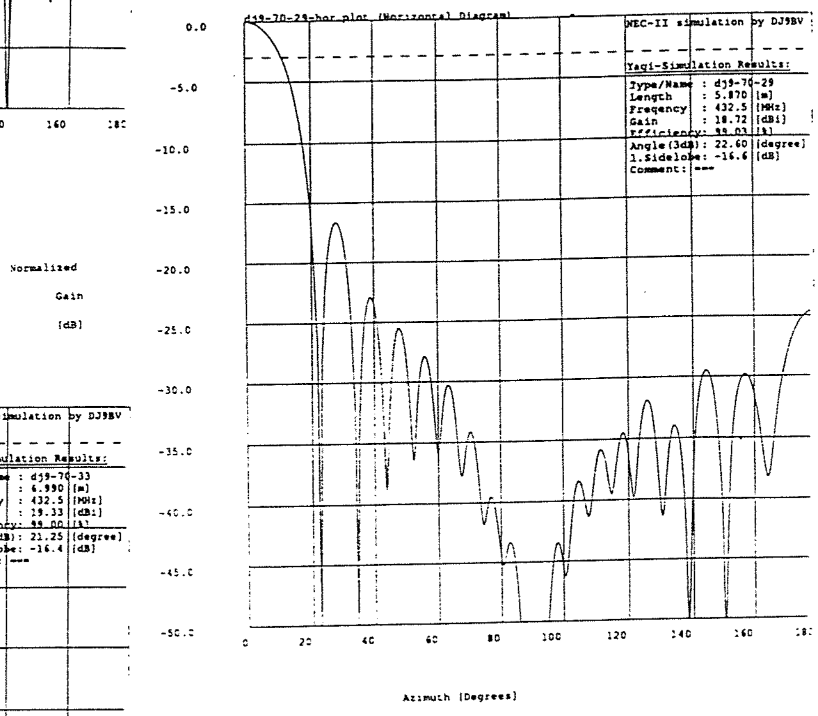


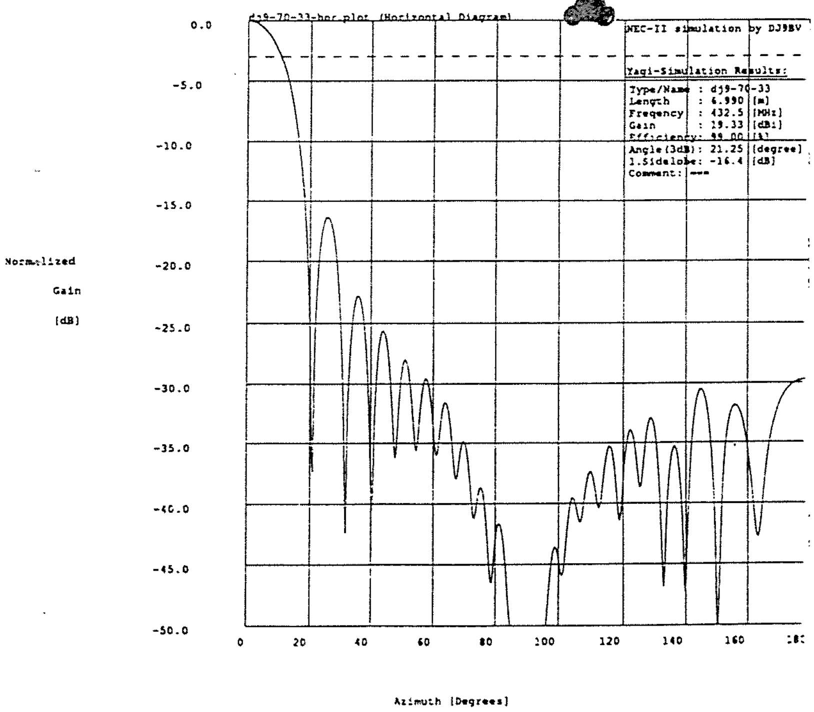
4. Elektrische Werte(Messungen/ Simulation) @ 432,5 MHz

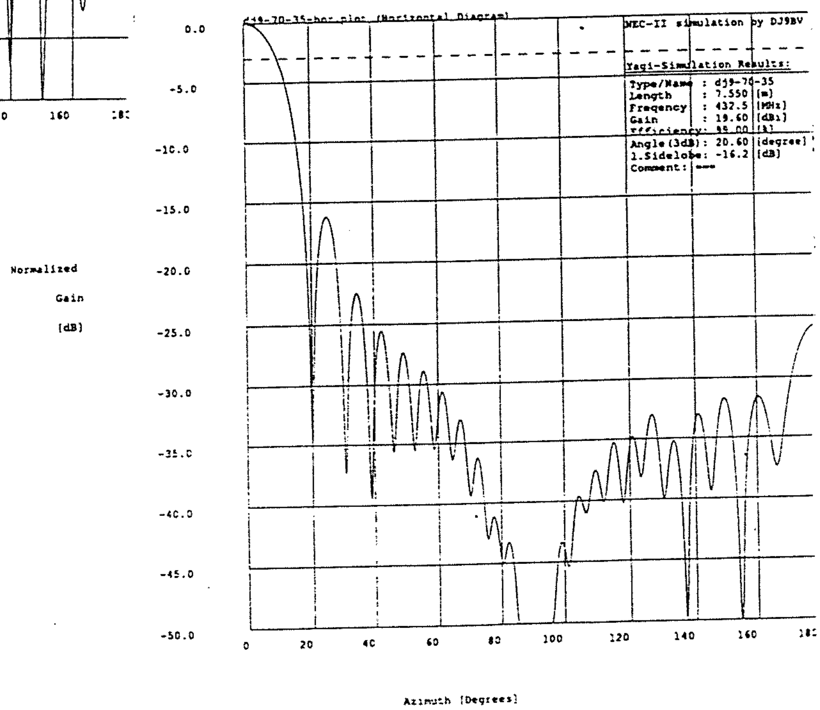
Typ	Gain[dBD]	Phi-Hor [Grad]	Phi-Ver	D-Hor [m]	D-Ver
7,25	16,0	24,0	25,0	1,67	1,60
8,50	16,5	22,6	23,5	1,77	1,70
10,0	17,1	21,3	22,0	1,87	1,82
11,0	17,4	20,6	21,2	1,94	1,89

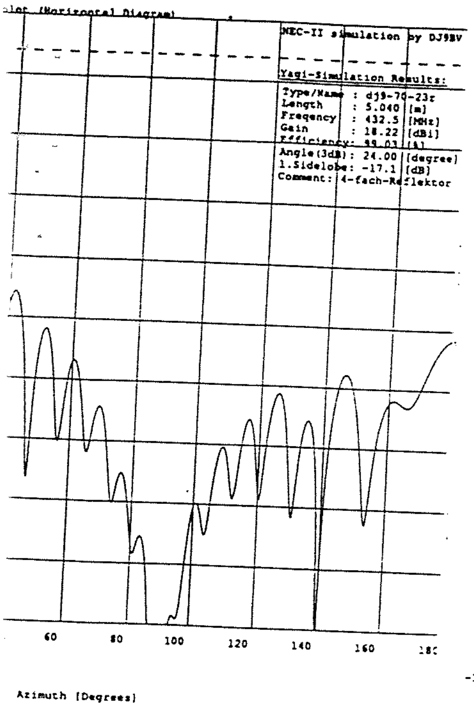
Phi-Hor, Phi-Ver : 3 dB Oeffnungswinkel horizontal und vertikal (Angles)
D-Hor, D-Ver : Optimale Stockungsabstaende (Optimal Stacking)

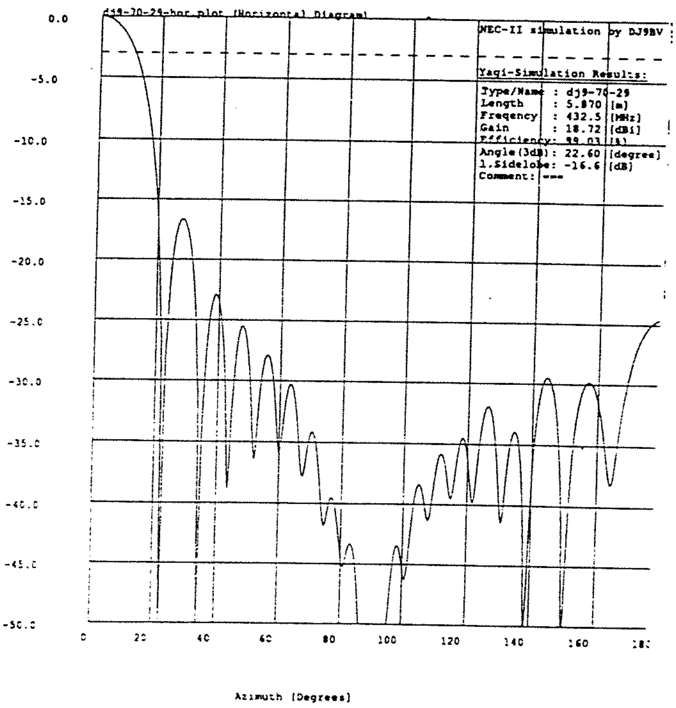

dj9-70-23r-hor.plot (Horizontal Diagram)
NEC-II simulation by DJ9BV
Yagi-Simulation Results:
Type/Name : dj9-70-23r
Length : 5.040 [m]
Freqency : 432.5 [MHz]
Gain : 18.22 [dBi]
Efficiency: 99.03 [%]
Angle(3dB): 24.00 [degree]
1.Sidelobe: -17.1 [dB]
Comment: 4-fach-Reflektor
Normalized Gain [dB]
Azimuth [Degrees]

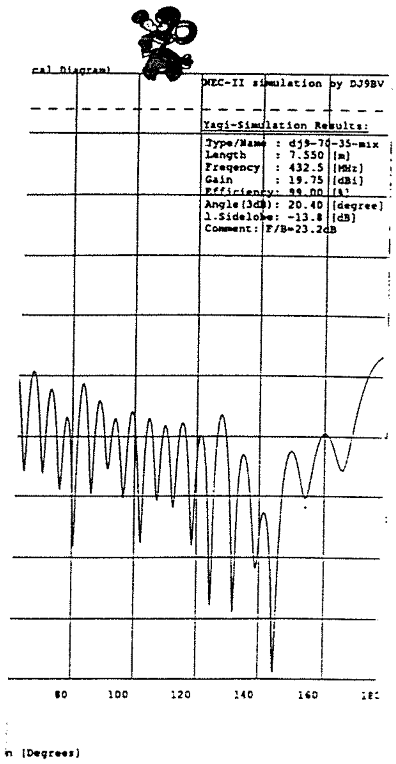

dj9-70-29-hor.plot (Horizontal Diagram)
NEC-II simulation by DJ9BV
Yagi-Simulation Results:
Type/Name : dj9-70-29
Length : 5.870 [m]
Frequency : 432.5 [MHz]
Gain : 18.72 [dBi]
Efficiency: 99.03 [%]
Angle(3dB): 22.60 [degree]
1.Sidelobe: -16.6 [dB]
Comment: ---
Normalized Gain [dB]
Azimuth [Degrees]

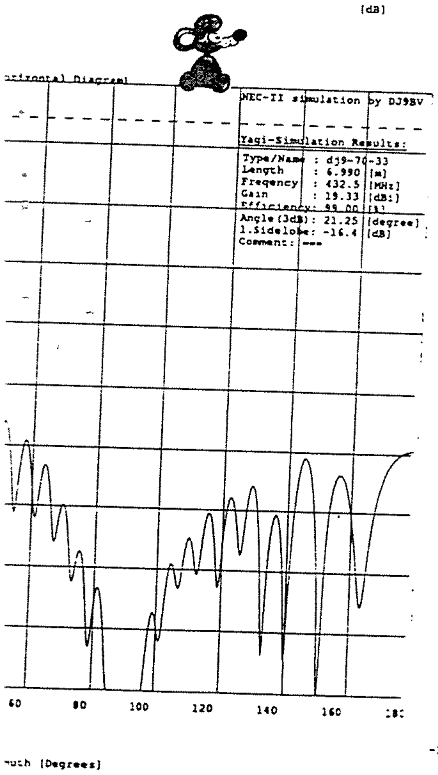

dj9-70-33-hor.plot (Horizontal Diagram)
NEC-II simulation by DJ9BV
Yagi-Simulation Results:
Type/Name : dj9-70-33
Length : 6.990 [m]
Freqency : 432.5 [MHz]
Gain : 19.33 [dBi]
Efficiency: 99.00 [%]
Angle(3dB): 21.25 [degree]
1.Sidelobe: -16.4 [dB]
Comment: ---
Normalized Gain [dB]
Azimuth [Degrees]

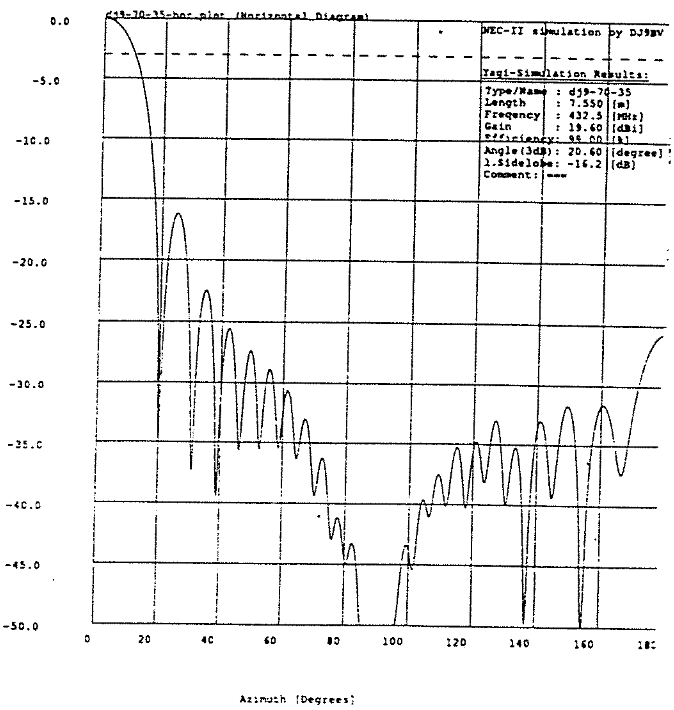

dj9-70-35-hor.plot (Horizontal Diagram)
NEC-II simulation by DJ9BV
Yagi-Simulation Results:
Type/Name : dj9-70-35
Length : 7.550 [m]
Frequency : 432.5 [MHz]
Gain : 19.60 [dBi]
Efficiency: 99.00 [%]
Angle(3dB): 20.60 [degree]
1.Sidelobe: -16.2 [dB]
Comment: ---
Normalized Gain [dB]
Azimuth [Degrees]











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MSN & CT DECEMBER 1987

DESIGN: Low-Power MIC Diode Doubler
By **Robert J. Hess,** Loral Terracom

RF Design **November 1987**

Featured Technology — Designing Effective Two-Tone Intermodulation Distortion Test Systems
This article is a comprehensive description of a key RF test procedure: evaluation of intermodulation distortion (IMD) performance. In the high-ambient RF environments found today, good IMD dynamic range specifications are essential. — *Manfred Bartz*

Broadband Microwave Transistor Amplifier Design Using S-Parameters
In this article, the author takes us step-by-step through the design of a 1 to 2 GHz broadband amplifier, using S-parameter characterization. This rigorous examination illustrates in detail the basic principles of amplifier design. — *Jackie L. Hughes*

VHF Oscillators Using Microwave Integrated Circuits
demonstrates the use of common 50 ohm gain blocks in 50 and 250 MHz oscillators. — *Wes Hayward*

RF Design **December 1987**

Development of a New Direct VHF Synthesizer
Programmed Test Sources' new PTS-300, a signal synthesizer covering 0.1-300 MHz in 1 Hz steps, was developed to meet a specific set of performance requirements. This article provides insight into the engineering tasks required for the development of a new instrument by describing some of the concepts, design techniques and packaging methods developed by the PTS staff to create a synthesizer meeting their goals.

Featured Technology — S-Parameters of Wideband Op Amps and Buffers
High speed op amps and buffers are being increasingly used in RF and related analog applications. This article shows how these components' S-parameters can be measured, allowing engineers to use well-known RF design techniques with the DC-coupled, feedback-controlled technology of operational amplifiers. — *Brian Mathews*

RFI/EMC Corner — RF Radiation Hazards: Power Density Prediction for Communications Systems
Both public awareness and governmental regulation are increasing in the controversial area of non-ionizing radiation hazards. As a result, modeling and prediction of hazards will be required to determine whether a proposed communications system will exceed allowable levels. This article applies basic electromagnetic radiation models to ANSI standard C95.1-1982, the most widely used hazard guideline currently in use. — *Gary A. Breed*

VHF COMMUNICATIONS 4/87

Roman Wesolowski, DJ 6 EP	**5760 MHz Power-Amplifier using the YD 1060**
Eugen Berberich, DL 8 ZX	**VCOs using Semi-Rigid Cable Tuned Circuits**
Dragoslav Dobričić, YU 1 AW	**Pre-amplifier – Pros and Cons**
Dragoslav Dobričić, YU 1 AW	**Low-Noise 144 MHz Pre-Amplifier using Helical Tuned Circuits**

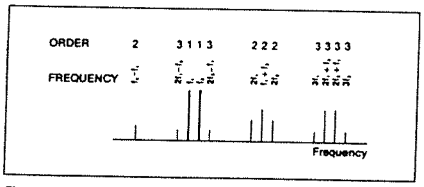


Figure 1. Second and Third Order Two-Tone Distortion Products.

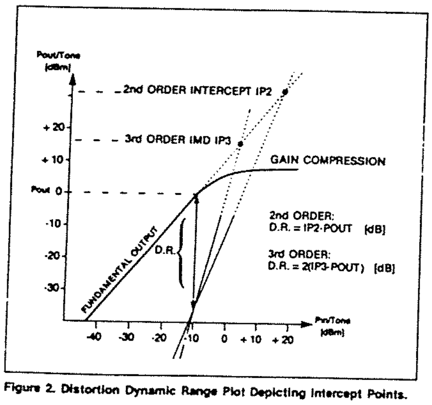
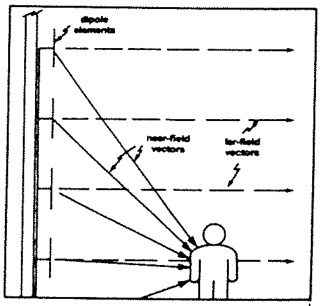


Figure 2. Distortion Dynamic Range Plot Depicting Intercept Points.



L'ONDE ELECTRIQUE janvier 1988

Analyse d'une micro-antenne à double fente à très large bande passante, *par P. POEY, G. DUBOST, M. BAHRAM et P.L. GUIGUE*

Toute l'électronique Janvier 1988

Les résonateurs à ondes acoustiques de surface, les résonateurs diélectriques, par R. Besson.

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Tête forgée à faces polies. Manche en bois
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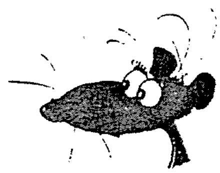


Cher OM,YL et SWL

Par la présente nous vous remercions pour l'intêret que vous manifestez à l'activité de notre Association.
Par votre assistance technique ,votre adhésion,vous nous avez permis de mettre en service le RI-élément essentiel des possibilité de communication entre tous les OM du département.
Nous souhaitons resserrer les liens et proposons une rencontre pique-nique pour le Dimanche 26 Juillet.
A ce jour le lieu n'est pas défini. Nous pensons choisir le centre du 07; que le site nous permette des liaisons Radio correctes ... la possibilité d'abri en cas de mauvais temps.
... informations plus précises seront communiquées

Precision powermeter for 144-2320 MHz with automatic VSWR display

Rainer Bertelsmeier
DJ9BV
Glcksburger Str. 20
2 Hamburg 50

1. Introduction

An accurate powermeter is an important piece of measurement equipment for each serious VHF/UHF-amateur. Commercial equipment is very expensive. Products designed for amateur use usually have insufficient quality.

The following article describes an electronic powermeter which in conjunction with commercially available precision directional couplers provides the following features:

(1) Frequenc range:
- 144 - 2320 MHz

(2) Power range:
- 1,2-4000 (not usable) Watt @ 144 MHz
- 0,3-1000 (0,6-2000) Watt @ 432 MHz
- 0,03-100 (0,12-400) Watt @ 1296 MHz
- 0,01-40 (0,03-100) Watt @ 2320 MHz
- with Directional Coupler EME2320A (EME2326A: Values in brackets)

(3) Functions:

Power measurement
- Forward-,Backward-Power
- PEP measurement (Peak power)
- CW measurement (Avarage power)
- 3 power ranges : 1,10,100

Automatic VSWR-measurement (Built-in analog computer)
- VSWR-Low : 1,0 - 2,0
- VSWR-High: 1,0 - Infinite

(4) Power supply:
- NC-Accu (Max. 10 hours)
- Mains 220 V (NC-Accu is charged)

(5) Directional coupler:
- Any suitable directional coupler can be used
- Connection via 5-pin DIN-socket up to 20 m remote

2. Functional description of directional couplers

A directional coupler provides a directional sensitive coupling between a main coaxial line and a coupled coaxial line. Directional couplers with two coupled lines with reverse directional sensivities provide an easy means to measure the forward and backward power on a coaxial line simultanously (Figure 1). The coupled RF-Power on the coupled line can be rectified by RF-Detectors (i.e. Schottky rectifier) and the resultant DC-voltage can be indicated.

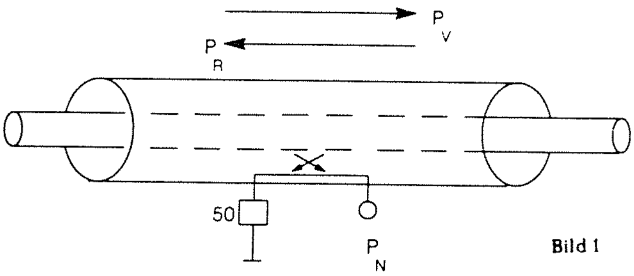


Bild 1

Directinal coupler have certain quality properties:

- Coupling $K=\sqrt{\frac{P_n}{P_v}}$
- Isolation $I=\sqrt{\frac{P_n}{P_r}}$
- Directivity $D=\frac{K}{I}$

Directivity determines the ability of a directional coupler to differentiate between forward and reflected power on the main line. It limits the accuracy of the measurement of power and return loss ($RL=\sqrt{P_r/P_v}$). The VSWR can be calculated from the return loss RL by a simple equation.

The diagram of a coupled line (Figure 2) shows the two RF-voltages, which develop from the forward power and the reflected power. These two voltages add with their magnitude and phase:

$$\bar{U}_N=\frac{\bar{U}_V}{I}+\frac{\bar{U}_R}{K} \text{ bzw. } \bar{U}_N=\frac{1}{K}(\bar{U}_R+D\bar{U}_V).$$

With finite isolation the two voltages can add in phase or even cancel (phase is 180 °). So a variable measurement error, which depends on the directivity and the current relative phase of forward and reflected wave on the main line, will be observed.

This fact can be observed by inserting a directional coupler at different positions on a coaxial line. The indicated VSWR will be a function of the position on the line, because the relative phase changes. If the measured return loss has the same magnitude as the directivity the measurement error reaches 100%. In this case the two resulting voltages on the coupled line $\frac{\bar{U}_v}{I}$ und $\frac{\bar{U}_r}{K}$ (Figure 2) have the same magnitude. Therefore they can add to zero or to twice their value dependent on their relative phase.

The directivity is the lower bound on the measurable return loss.

VSWR can be derived from return loss:

Equation(1):

$$VSWR=\frac{1+RL}{1-RL}$$

mit $RL=\frac{|\bar{U}_r|}{|\bar{U}_v|}$

Available VSWR-Meters, offered for amateur bands on VHF/UHF, have couplers of poor directivity. For example strip-line couplers or open lines provide directivities of not more than 20 dB.

Good couplers have a directivity of better than 30 dB. Examples of good couplers are the BIRD-43 and the couplers produced by EME.

Especially the couplers 2320A and 2326A of EME show an excellent value of directivity over a great frequency span (Figure 3).

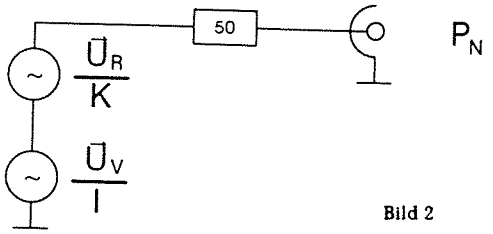


Bild 2

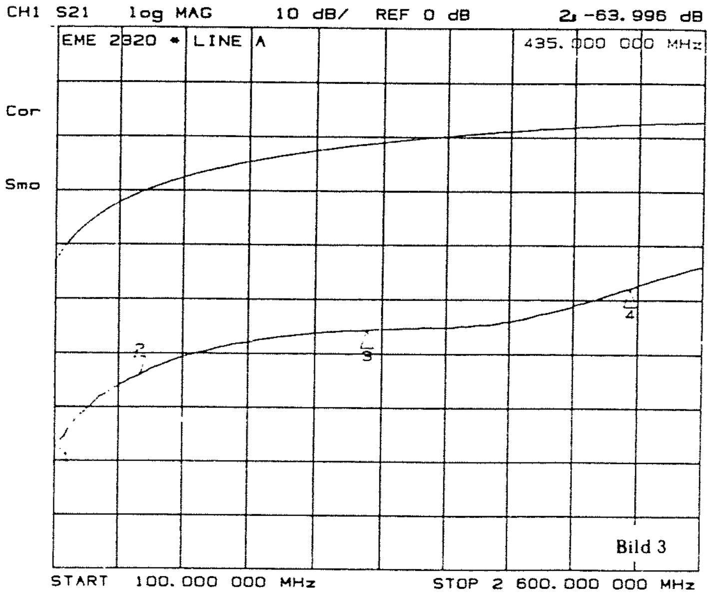


Bild 3

The following table displays the typical values:

Typical parameters EME2320A		
Frequency [MHz]	C [dB]	D [dB]
144	-37	35,5
432	-30	33,5
1296	-20	34
2320	-16	30,5

The following table indicates the influence of directivity on the measurement error:

Tabelle 1:

VSWR-measurement error @ directivity D							
True VSWR	RL	Measured VSWR (Minimum - Maximum)					
	[dB])	D=33db		D=30dB		D=20db	
1.05	32.26	1.00	1.10	not measurable		not meas.	
1.10	26.44	1.05	1.15	1.03	1.17	not meas.	
1.15	23.13	1.10	1.20	1.08	1.23	not meas.	
1.20	20.83	1.15	1.26	1.13	1.28	not meas.	
1.25	19.08	1.19	1.31	1.17	1.33	1.02	1.54
1.30	17.69	1.24	1.36	1.22	1.39	1.06	1.60
1.40	15.56	1.34	1.47	1.31	1.49	1.14	1.73
1.50	13.98	1.43	1.57	1.40	1.60	1.22	1.86
1.60	12.74	1.53	1.68	1.50	1.71	1.30	1.99
1.80	10.88	1.71	1.89	1.68	1.93	1.46	2.26
2.00	9.54	1.90	2.10	1.86	2.15	1.61	2.53
2.20	8.52	2.09	2.32	2.05	2.37	1.76	2.81
2.40	7.71	2.28	2.53	2.23	2.59	1.91	3.10
2.60	7.04	2.46	2.75	2.41	2.82	2.05	3.39
2.80	6.49	2.64	2.97	2.58	3.04	2.19	3.69
3.00	6.02	2.83	3.19	2.76	3.27	2.33	4.00
3.50	5.11	3.28	3.74	3.20	3.84	2.67	4.81
4.00	4.44	3.73	4.30	3.63	4.43	3.00	5.67
4.50	3.93	4.18	4.86	4.06	5.02	3.31	6.59
5.00	3.52	4.62	5.43	4.48	5.63	3.62	7.57

(Remark:
The assumed values for directivity are characteristic values:
33db:Typical value for EME-2320A.
30dB:Guaranteed value for EME-2320A and BIRD 43.
20dB:Typical value for an "unspecified" coupler, i.e. amateur type equipment)

It can easily be concluded, that the quality of simple amateur type couplers is unsatisfactory even for low demands on accuracy. A directinal coupler with a directivity of at least 30 dB is a mustfor measuring an VSWR under 1.2.

3. Powermeter construction

The use of a precision directional coupler a la BIRD or EME is one condition for a good power meter. A second one is the realisation of wide dynamic range RF-rectifiers with Schottky diodes. That's not an easy task, as can be seen in Figure 4. The dynamic range of simple detectors is very limited. A simple Schottky-detector ("Ohne Vorstrom") shows an dynamic range of only 20 dB

Such a small dynamic range is not sufficient to use the excellent directivity of 33 dB of an EME-coupler. So the RF-detectors limit the accuracy of VSWR measurement.

Sometimes different scales are provided to get rid of the unlinear detector. So you arrive with 12 scales for 4 bands and 3 power ranges per band! Second, because of the poor linearity, the minimum power, which is necessary for measurement of a certain VSWR is very large, because the diode on the reflected power line cannot detect small RF-power. So you need 1000 W = 60 dBm forward power at 432 MHz on the main line to develop 10 mW = 10 dBm on the reflected power line with a VSWR of 1.22 = 20 dB return loss on the main line (60 dBm power - 20 dB return loss - 30 dB coupling factor = + 10 dBm)!.

A better solution is the linearisation of the Schottky detector by a small DC-current and the compensation of the ON-voltage of .2 Volts. A dynamic range of ca. 35 db is achievable (see curve "mit Vorstrom" in Figure 4). Powers on the coupled lines down to - 5 dBm can be measured with 1 dB linearity and down to -15 dBm can be indicated.

This high dynamic range of the RF-detectors allows the following properties:

1. One scale for 3 power ranges (1,10,100) and all bands.
2. VSWR-measurements down to the directivity limitation (VSWR min = 1,045) even with small forward power.
3. Automatic VSWR-measurement and display by analog computation of the quotient of U_r und U_v over the full dynamic range.
4. Great linear display range for power (EME2320A-coupler)

   144 MHz:1,2 - 4000 W
   432 MHz:0,3 - 1000 W
   1296 MHz:0,03 - 100 W
   2320 MHz:0,01 - 40 W

The following table displays the minimum power for accurate VSWR-measurement:

Table 2:

Minimum forward power for VSWR-measurement			
Frequency	Minimum power [W]		
[MHz]	SWR=1,5(RL=14dB)	SWR=1,22(RL=20dB)	SWR=1,1(RL=26dB)
144	50	200	800
432	8	32	126
1296	0,8	3,2	13
2320	0,3	1,2	5

With forward power greater than the value in the table the resulting VSWR will be displayed accurate independent on the forward power. With forward power lower than the table value the displayed VSWR is "optimistic", i.e. the true return loss is only 3 dB less with even 1/10 of the minimum power.

HF-Kennlinien von Schottky-Dioden

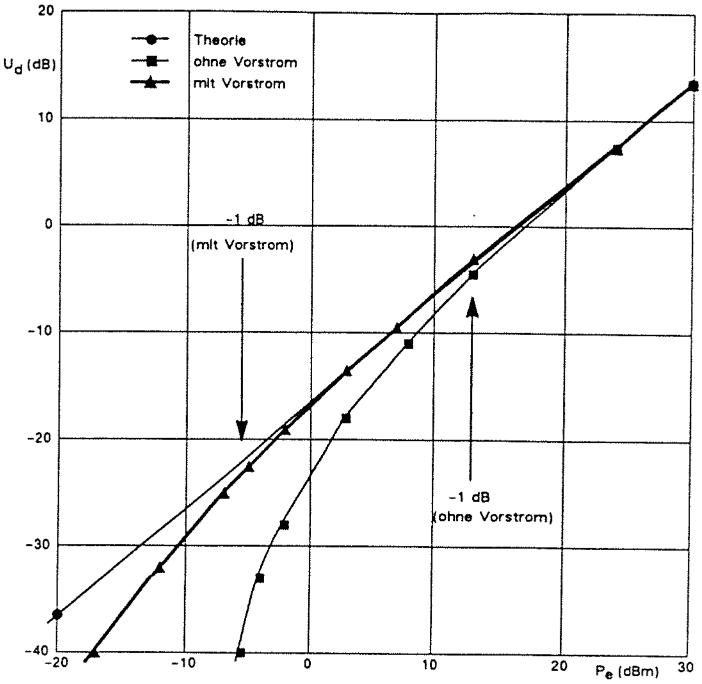


Bild 4

4. Technical realisation

4.1. Linearisation of Schottky detectors

The Schottky diodes in the RF-detectors have a small ON-current of ca. 20 µA. The small ON-voltage of 0.2 Volt is compensated by means of a subtracting operational amplifier, which subtracts the temperature sensitive voltage of an Si-diode in the right proportion.

4.2. VSWR-Computation

The two voltages U_v and U_r are input to an analog divider, which calculates the quotient of U_v and U_r, i.e. the return loss, over the full dynamic range of 35 dB. The scale of the display instrument reads directly VSWR or return loss. By weigthing the reflected voltage by a factor of 3 a sensitive scale with VSWR=2.0 full scale is realized. The user can switch between "High" and "Low" VSWR scale.

4.3. PEP-power display

By virtue of a peak/hold circuit the peak envelope power can be displayed. The aquisition time is 5 msec and the hold time is about 4 sec. This feature is useful for tuning of PA's with morse code or voice.

4.4. Power ranges and accuracy

For each frequency band a separate calibration is possible. Possibly different coupling factors for the two coupled lines can be tuned also. Because of the large dynamic range of the RF-detectors, the power range can be switched in three decades, i.e. over 30 dB full scale. The deviation from the quadratic relationship is less than 0.4 db over this range, That corresponds to an error of 9 %.

The smallest indicatable power is -45 dB from full scale.

The maximum power in each band depends on the coupling factor only. The power on the detector is limited to +30dBm. So the maximum power, which can be callbrated , is 30 dBm + coupling factor. However you have to care for the maximum power rating of the connectors also to determine the real usable maximum power. For the case of two different couplers from EME the resulting power limits are given above.

4.5. Power supply

The electronics are powered by 6 AA-size NC-batteries, which are charged if the instrument is connected to the mains. The battery operation is useful for nearly 10 hours before recharging. Charging current is very low (C/50), so no danger of overcharging exists. Built inverters and regulators eliminate any changes in the supply voltage.

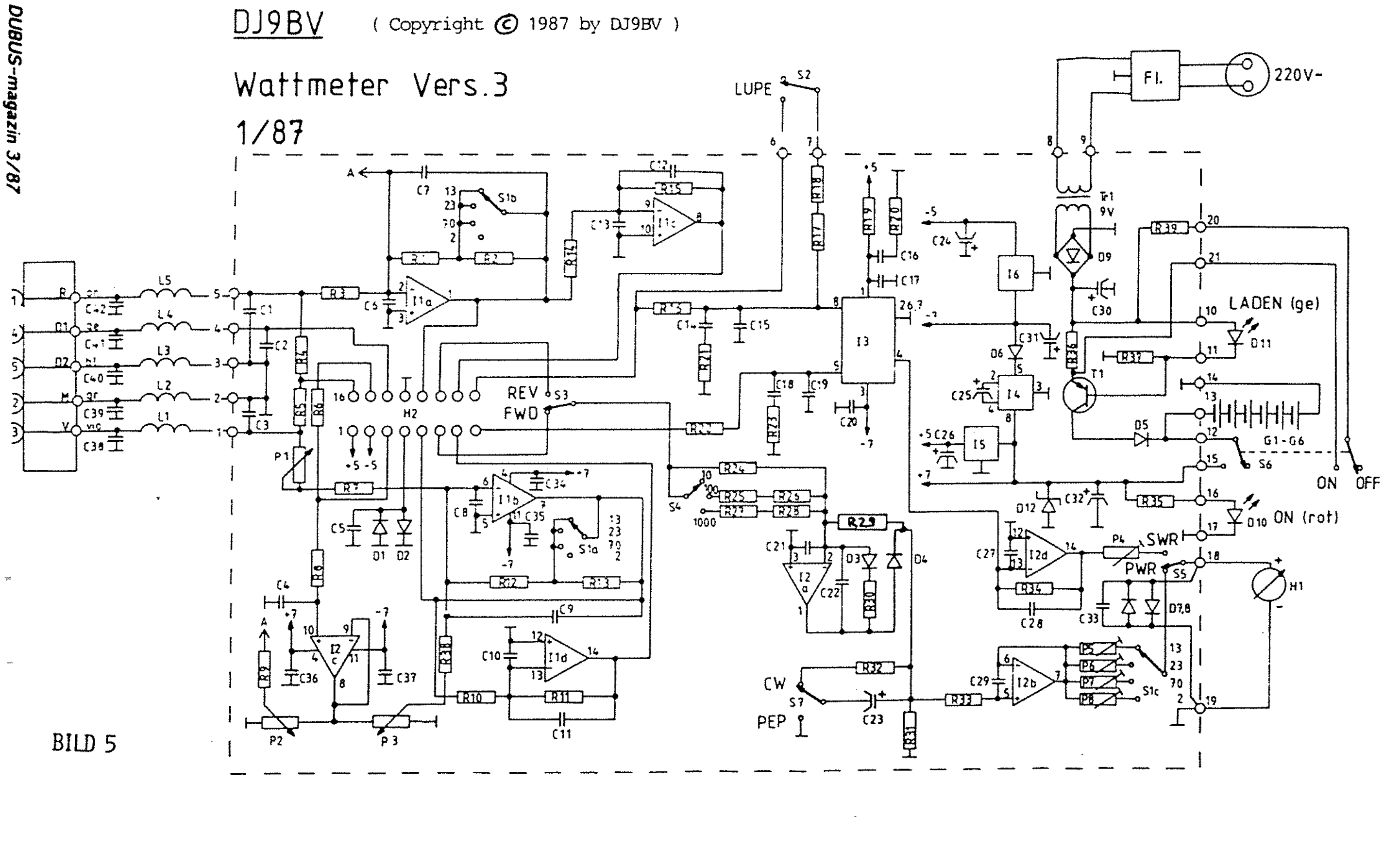


BILD 5

5. Operation

The front plate has switches for:

Range: 1,10,100
Mode: PEP/CW
Meter: PWR/SWR
Dir: FWD/REV
Band: 2,70,23,13
SWR: Low/High
OFF: EIN/AUS

The scale of the display instrument has divisions for:

P: Power (0,1 - 10 Watt)
RL: Return loss (10 - 30 dB)
VSWR: (Low: 1,0-2,0; High: 1,0 - Infinite)

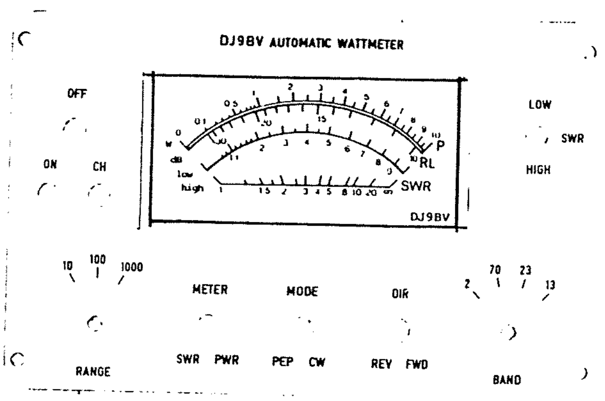


Bild 6

Two LED's show the state: The red one is for ON and the yellow one is illuminated during charging.

For power measurement the switch "METER" is switched to "PWR". The switch "DIR" selects between forward and reflected power. Switch "MODE" selects "PEP" or avarage value "CW" display.

If the meter switch is switched to "SWR", one can select two sensivities for VSWR measurement with the SWR switch. In the "LOW" position the corresponding return loss can be read from the RL-scale (10-30db).

6. Calibration

The calibration procedure is covered in the construction documentation. !

Si vous êtes sages je vous traduirai le chapitre calibration (Dubus 3-87) mais là je n'ai pas eu le temps !!

Halbleiter

Menge	Typ	Wert	Hersteller	Alternative	Bezeichnung
2	TL084CN		TI	NS,Mot	I1,I2
1	RC4200ANB		Raytheon		I3
1	LTC1044CN8		LT		I4
1	78L05ACP		Mot	TI,NS	I5
1	79L05ACP		Mot	TI,NS	
1	BD136		Si,Valvo		T1
8	1N4148,1N914	TI	alle	D1-D8	
1	B40C800	rund	alle	alle	D9
1	LED gelb	5 mm	alle	alle	D10
1	HLMP4700(LED rot	5 mm	HP		D11
1	Zener 5% 0,4W	10V	alle		D12

Widerstände

Menge	Typ	Wert	Hersteller	Alternative	Bezeichnung
2	MBB0207,1%	39	Beyschlag	alle	R17
1	"	100	"	"	R36,39
1	"	330	"	"	R28
2	"	1k	"	"	R30,R37
1	"	2,7k	"	"	R18
1	"	3,9k	"	"	R35
3	"	4,7k	"	"	R20,21,23
2	"	5,6k	"	"	R16,22
1	"	8,2k	"	"	R34
4	"	10k	"	"	R8,19,32,33,34
9	"	22k	"	"	R1,2,6,10,11,12,13,14,15
1	"	33k	"	"	R27
1	"	39k	"	"	R26
1	"	47k	"	"	R7
1	"	51k	"	"	R3
2	"	82k	"	"	R9,R38
1	"	100k	"	"	R25
2	"	220k	"	"	R4,5,29
1	"	300k	"	"	R24
1	"	1M	"	"	R31
3	Cermet 1 G.	10k	DOC	Weston	P1,2,3
5	Cermet 10 G.	5k	"	Bourns	P4,5,6,7,8

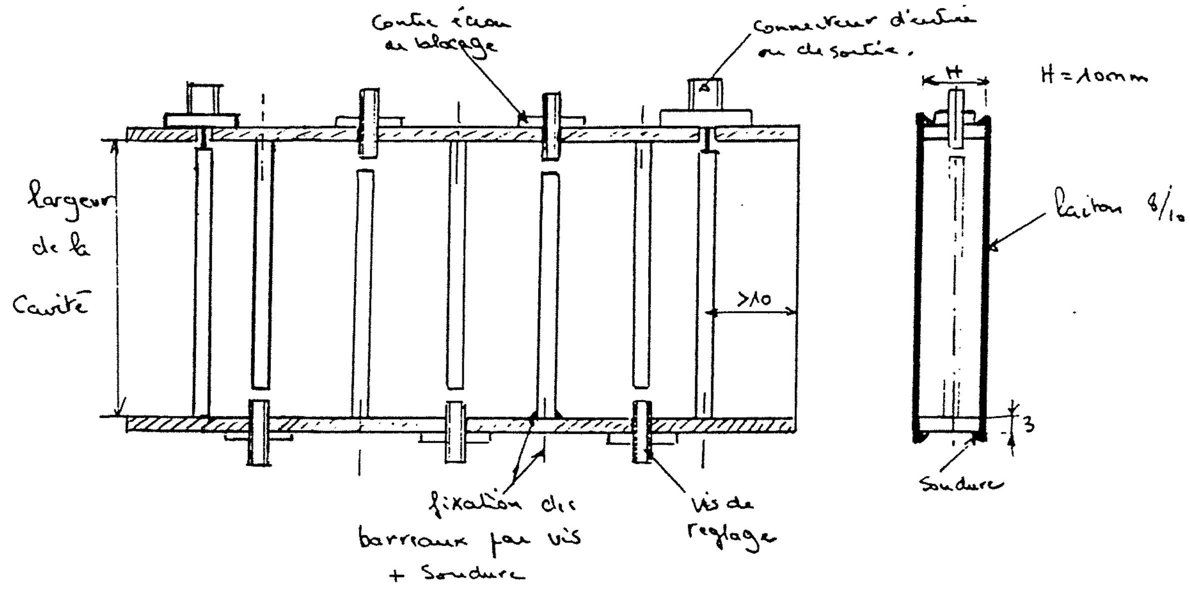
Kondensatoren

Menge	Typ	Wert	Hersteller	Alternative	Bezeichnung
3	EDPU-0,6(2) 100V	100p	Valvo	alle	C15,17,19
14	EDPU-0,6(2) 100V	470p	Valvo	alle	C6,8,10,13,21,27,29,38-42
12	EDPU-0,6(2) 100V	1000p	Valvo	alle	C1-C5,C7,9,11,12,22,28,33
3	EDPU-0,6(2) 63V	0,01u	Valvo	alle	C14,16,18
5	KDPU 50V	0,1u	Valvo	alle	C20,34-37
4	TAG 16V (Tantal)	10u	ITT	alle	C24-26,31
1	TAG 16V (Tantal)	22u	ITT	alle	C23,32
1	EN 12.35 25V(Alu)	100u	ITT	alle	C30

Groß- und Kleinteile

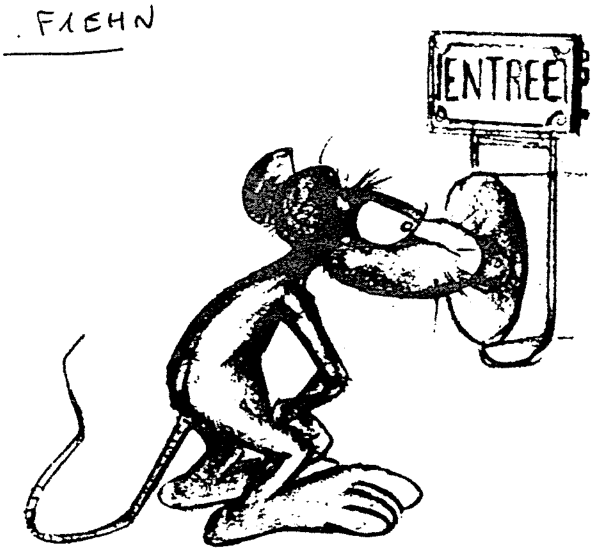
Menge	Typ	Wert	Hersteller	Alternative	Bezeichnung
1	RuC 100	1 mA	Neuberger	-	H1
1	Rahmen f. RuC100		Neuberger	-	H1 a
1	SBL11 1-3x4		ITT	-	S1
1	SBL11 1-4x3		ITT	-	S4
3	MSTS-101DB	1pol-U	Knitter	-	S3,5,7
1	9080.0101	1pol-U	Marquard	-	S2
1	9080.0201	2pol-U	Marquard	-	S6
2	C93 0802 IC-Sock.	8pol	TI	alle	So1,2
2	C93 1402 IC-Sock.	14pol	TI	alle	So3,4
1	C93 1602 IC-Sock.	16pol	TI	alle	So5
2	71206-050 Buchse	5pol	Hirschm.	-	Bu1,2
1	Stasei 2 Buchse	3pol	Hirschm.	-	Bu3
2	71206-050 Stecker	5pol	Hirschm.	-	St1,2
1	Stak 2 Stecker	3pol	Hirschm.	-	St3
3	A16-P Montage-Pl.	16pol	Assmann	alle	MP1,2,3
1	Geh. 2008-1000H		Zeissler	-	
1	Trageb. 2008-3500		Zeissler	-	
1	Al.-Geh. 1061503	IP65	Rose		
2	Drehk. 499.40		Mentor		
6	NC-Akkus AA	500mAh	Varta	National	
1	Akku-Halter.	6x		alle	
1	Trafo VR1109	9V	Block	alle	
5	Drossel 02036690	1,5Wdg	Valvo		
2 m	Kabel LiY(C)Y	5x0,14	Kluxen	alle	
1	Platine doppels.	Europa	DJ9BV	DK3LL	

FILTRES INTERDIGITES -F1EHN



les barreaux sont repérés de 1 à 7
Dist CAC est la distance de centre à centre séparant deux barreaux.

73 . F1EHN



Calcul d'un filtre interdigital

F0= 5760.00000 BP= 100.00000 Rip= 0.30000 N= 5

G(1)= 1.481677
G(2)= 1.299208
G(3)= 2.309513
G(4)= 1.299208
G(5)= 1.481677
G(6)= 1.000000

G	D
36.67	0.62
36.67	0.72
36.67	0.58
36.67	0.58

H= 0.009621

ACG(1)= 6.926896	ACM(1)= 0.607102
ACG(2)= 4.705739	ACM(2)= 0.052244
ACG(3)= 5.222403	ACM(3)= 0.041846
ACG(4)= 5.232617	ACM(4)= 0.041846
ACG(5)= 5.222403	ACM(5)= 0.052244
ACG(6)= 4.705739	ACM(6)= 0.607102
ACG(7)= 6.926898	

N= 5 H= 10.00000

Numero	Diametre/H	Espacement/H	D.C.A.C/H	Diametre	Dist.C.A.C
K	DBO(K)	SBT(K)	C(K)	DBH(K)	CH(K)
1	0.52500	0.49568	0.94818	5.25000	9.48179
2	0.38000	1.24075	1.62575	3.80000	16.25750
3	0.39000	1.31176	1.70176	3.90000	17.01759
4	0.39000	1.31176	1.70176	3.90000	17.01759
5	0.39000	1.24075	1.62575	3.90000	16.25750
6	0.38000	0.49568	0.94818	3.80000	9.48179
7	0.52500			5.25000	

Barreau 2	Longueur= 8.92	Diametre= 3.80mm
Barreau 3	Longueur= 8.82	Diametre= 3.90mm
Barreau 4	Longueur= 8.82	Diametre= 3.90mm
Barreau 5	Longueur= 8.82	Diametre= 3.90mm
Barreau 6	Longueur= 8.92	Diametre= 3.80mm

Largeur de la cavite 13.02mm
(Lambda/4 a F0)

Calcul d'un filtre interdigital

F0=10368.00000	BP=	100.00000	Rip=	0.30000	N=	5

G(1)=	1.481677
G(2)=	1.299208
G(3)=	2.309513
G(4)=	1.299208
G(5)=	1.481677
G(6)=	1.000000

S	D
66.01	0.82
56.01	0.72
66.01	0.56
56.01	0.53

H= 0.005362

ACG(1)=	7.079917	ACM(1)=	0.454083
ACG(2)=	4.897193	ACM(2)=	0.029227
ACG(3)=	5.300601	ACM(3)=	0.023410
ACG(4)=	5.306361	ACM(4)=	0.023410
ACG(5)=	5.300601	ACM(5)=	0.029227
ACG(6)=	4.897193	ACM(6)=	0.454083
ACG(7)=	7.079917		

N= 5 H= 10.00000

Numero	Diametre/H	Espacement/H	D.C.A.C/H	Diametre	Dist.C.A.C
K	DBO(K)	SBT(K)	C(K)	DBH(K)	CH(K)
1	0.52500	0.58717	1.04217	5.25000	10.42167
2	0.38500	1.42289	1.81039	3.85000	18.10386
3	0.39000	1.49301	1.88301	3.90000	18.83009
4	0.39000	1.49301	1.88301	3.90000	18.83009
5	0.39000	1.42289	1.81039	3.90000	18.10386
6	0.38500	0.58717	1.04217	3.85000	10.42167
7	0.52500			5.25000	

Barreau 2	Longueur= 3.63	Diametre= 3.85mm
Barreau 3	Longueur= 3.57	Diametre= 3.90mm
Barreau 4	Longueur= 3.57	Diametre= 3.90mm
Barreau 5	Longueur= 3.57	Diametre= 3.90mm
Barreau 6	Longueur= 3.63	Diametre= 3.85mm

Largeur de la cavite (Lambda/4 a F0) 7.23mm

FILTRES INTERDIGITES 1296 et 2320 MHz (N° 24 Mai 86)

CARACTERISTIQUES TYPIQUES

1296 MHz

Pertes 1,5dB

Rejection OL 1152 75dB

Freq. image > 80dB

→ Dans le cas ou le boitier est fermé sur les cotés prevoir un espacement plus important sur les bords

2320 MHz

Pertes 1,5dB

Rejection OL 60dB

Freq. image 70dB

Quelques exemples de 1296 MHz

F1EHN	1,2dB	
F1DED	1,8 dB	Boitier Fraisé trop près
F1 COW	2,8dB	probleme de parallélisme des doigts ?!!

TRANSCEIVER 28-30 Mhz F6CER

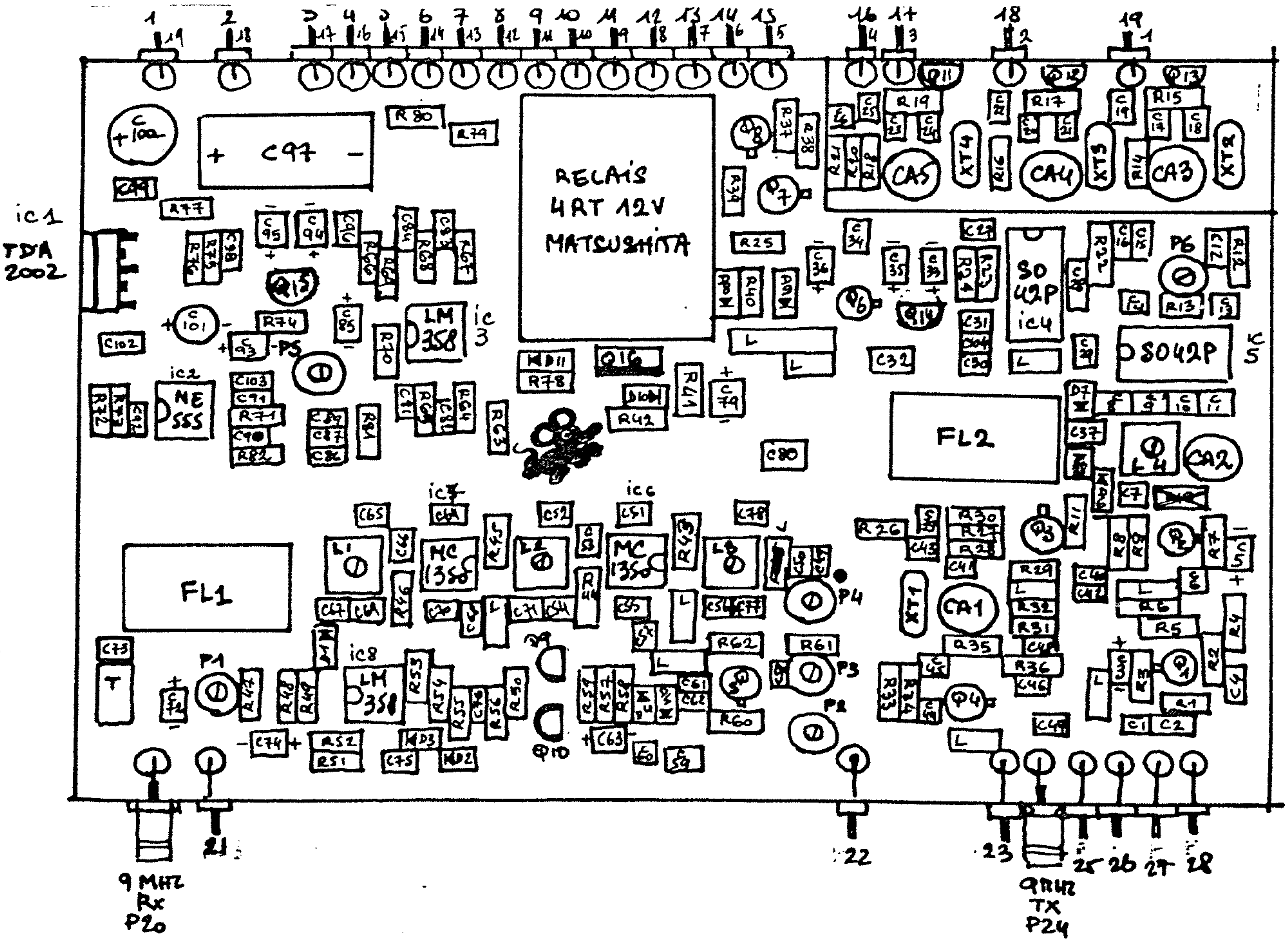
Pourquoi un transceiver 28 Mhz? :pour une raison bien simple: il sera plus façile de le faire précéder de transverters pour 50,144,432,et même 1296 voire de trafiquer sur 28! tout en réduisant le nombre de modules au strict minimum(un générateur 135-137 trés propre n'est pas évident à régler)
Les puristes ne seront peut être pas trés satisfaits car un double changement de fréquence nuit toujours à la dynamique, mais de toute façon le résultat est tellement supérieur à n'importe quel appareil Japonnais que l'on peut être rassuré!

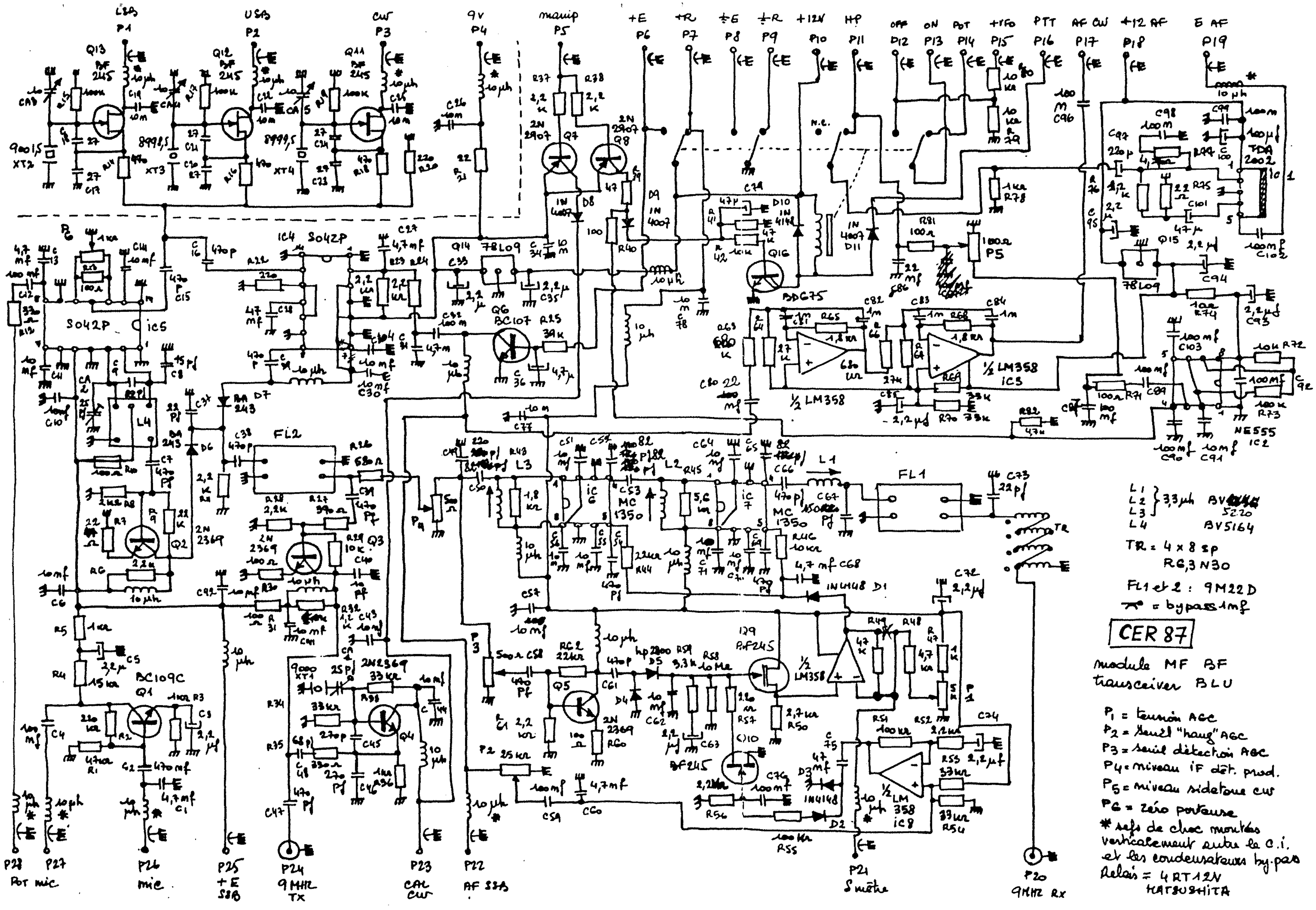
Pourquoi ce plan de fréquence? pour une raison pratique,donc, et puis il est toujours possible de réaliser la platine RF pour 144 au lieu de 28,mais on sera désavantagé si l'on veut faire du 432 (un transverter 144-432 est toujours assez vicieux à faire fonctionner)

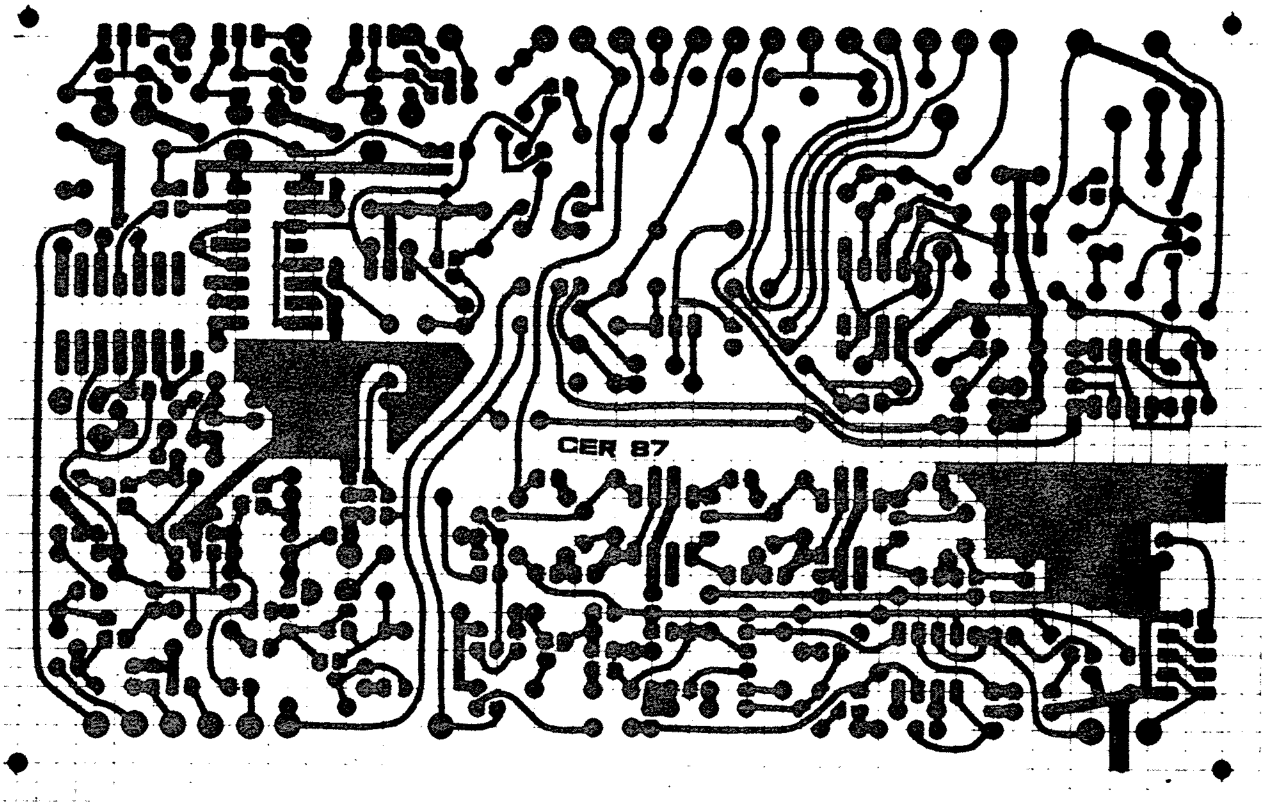
Bref deux modules principaux: le premier,dans une boite Schubert 100X160X30 comprend toute la tète HF emission et reception,le mélangeur,le noise-blanker(merci DL7QY) ainsi que la partie F.I. pour la NBFM!!!! désolé les gars,mais BERIC se débrouille pour approvisionner les composants donc il faut un petit argument de vente pour un plus grand nombre de modules! de toute façon,personne ne vous oblige à cabler cette partie.

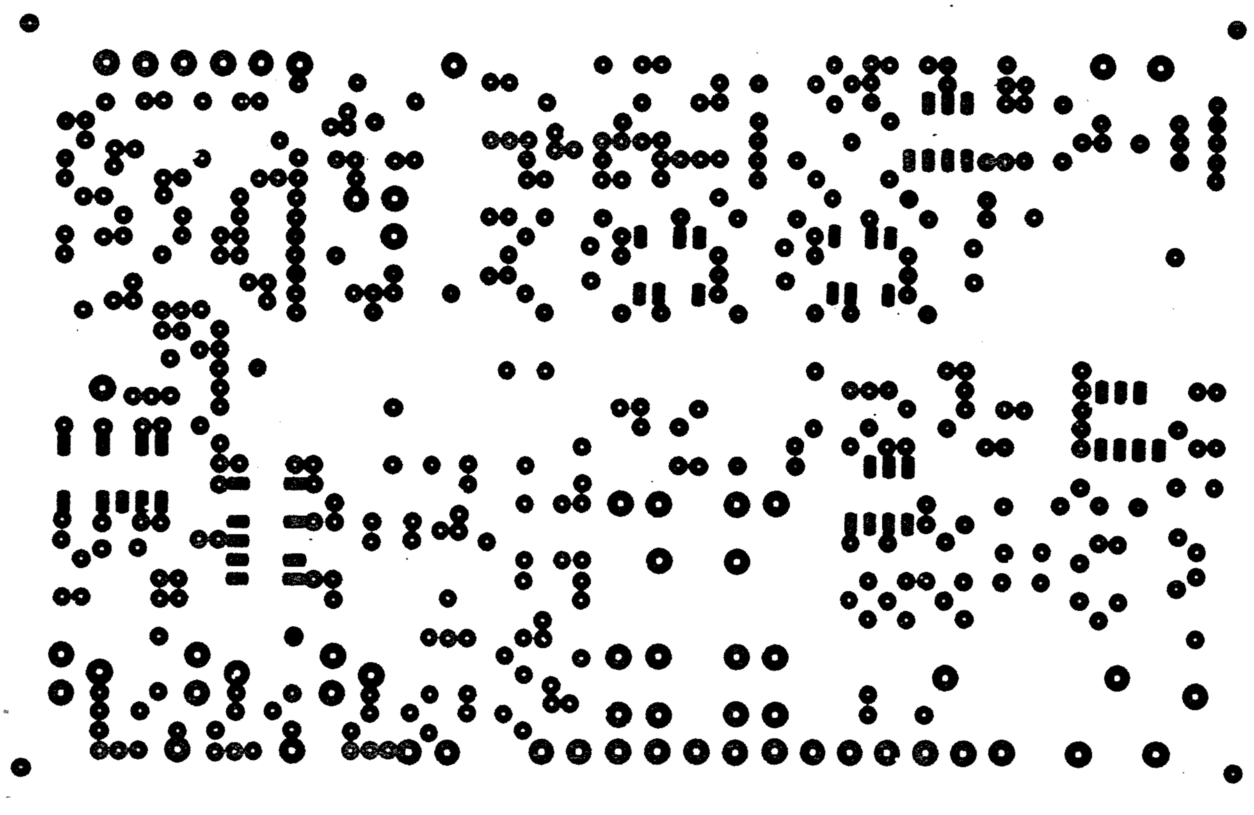
pour en terminer avec cette partie,sachez que l'on peut compter sur une puissance de sortie d'environ 350 mW et que le récépteur "fait" mieux que 0,4 microvolts,ce qui est de toute façon trop sensible,surtout pour suivre un transverter. Un atténuateur est prévu dans le circuit drain du CF300,les valeurs seront à adapter selon le gout de chacun.
Le second module,de dimension identique,comporte tout le reste:
à savoir-l'ampli F.I. SSB/CW
- -le détécteur de produit
- -le C.A.G.
- -l'ampli BF
- -le générateur BLU et CW
- -le préampli micro
- -toute la platine de commande,le relais,le QSK(CW)

Inutile de vous dire que la chose est relativement tassée,bien que tous les composants soient montés à plat.
Il reste donc à l'extérieur:
-le V.F.O. celui ci couvre de 17,3 à 19,3 (la fréquence MF choisie est en effet 10,7 Mhz) le choix de cette fréquence est la conséquence d'essais malheureux avec un VFO 19-21 et une MF 9 Mhz: l'harmonique 2 du VFO (38-42 Mhz moins 9 Mhz redonnait une partie de la bande par battement infradyne,impossible à filtrer de façon satisfaisante)
-éventuellement un compteur,une alimentation secteur,ainsi que différents connecteurs,potentiomètres,commutateurs,etc. mais selon le gout de chacun.




L1, L2, L3 } 3,3 µH BV 5220
L4 BV5164
TR = 4 x 8 sp
RG,3 N30
FL1 et 2 : 9M22D
= bypass 1mf
CER 87
module MF BF
transceiver BLU
P1 = tension AGC
P2 = seuil "haut" AGC
P3 = seuil détection AGC
P4 = niveau IF dét. prod.
P5 = niveau sidetone cw
P6 = zéro porteuse
* self de choc montées verticalement entre le c.i. et les condensateurs by-pass
Relais = 4RT12V MATSUSHITA
P1 LSB
P2 USB
P3 CW
P4 9V
P5 manip
P6 +E
P7 +R
P8 ±E
P9 ±R
P10 +12V
P11 HP
P12 OFF
P13 ON
P14 Pot
P15 +VFO
P16 PTT
P17 AF CW
P18 +12 AF
P19 E AF
P20 9MHz RX
P21 S mètre
P22 AF SSB
P23 CAL CW
P24 9MHz TX
P25 +E SSB
P26 mic
P27
P28 Pot mic





FACE SUPERIEURE
CER 87
CONTRETYPE

R1	47kΩ
R2	220 kΩ
R3	1kΩ
R4	15 kΩ
R5	1kΩ
R6	2,2kΩ
R7	22Ω
R8	2,2kΩ
R9	22kΩ
~~R10~~	~~100Ω~~
R11	2,2kΩ
R12	330Ω
R13	100Ω (1/8W *)
R14	470Ω
R15	100k
R16	470Ω
R17	100k
R18	470Ω
R19	100K
R20	220Ω
R21	22Ω
R22	220Ω
R23	2,2k
R24	2,2k
R25	39k
R26	680Ω
R27	390Ω
R28	2,2kΩ
R29	10kΩ
R30	100Ω
R31	100Ω
R32	1,2kΩ
R33	33kΩ
R34	33 kΩ
R35	330Ω
R36	1kΩ
R37	2,2k
R38	2,2k
R39	47Ω
R40	100Ω
R41	47kΩ
R42	10kΩ
R43	1,8kΩ
R44	22kΩ
R45	5,6kΩ
R46	10kΩ
R47	1kΩ
R48	4,7k
R49	47k
R50	2,7k

R51	100kΩ
R52	2,2kΩ
R53	33kΩ
R54	33kΩ
R55	100kΩ
R56	2,2MΩ
R57	220kΩ
R58	10MΩ
R59	33k
R60	100Ω
R61	2,2kΩ
R62	22kΩ
R63	680kΩ
R64	27kΩ
R65	1,8 MΩ
R66	680kΩ
R67	27kΩ
R68	1,8MΩ
R69	33kΩ
R70	33kΩ
R71	100Ω
R72	10k
R73	100k
R74	10Ω
R75	22Ω
R76	1200Ω
R77	4,7Ω
R78	1kΩ
R79	10kΩ
R80	10kΩ
R81	100Ω
R82	4,7k

L1	BV ~~5056~~ 5220
L2	BV ~~5056~~ 5220
L3	BV ~~5056~~ 5220
L4	BV5164
T	RG,3N30
RL	NF4RT 12V
FL1	9M22D *
FL2	9M22D *
XT1	9001,5 *
XT2	9001,5 *
XT3	8998,5 *
XT4	8998,5 *

(* ou équivalent
10,7MHz = 10M22D;
10701,5 et 10698,5)

C1	4,7mf
C2	470mf
C3	2,2µf
C4	100mf
C5	2,2µf
C6	10mf
C7	470pf
C8	15pf
C9	82pf
C10	10mf
C11	10mf
C12	100mf
C13	4,7mf
C14	10mf
C15	470pf
C16	470pf
C17	27pf
C18	27pf
C19	10mf
C20	27pf
C21	27pf
C22	10mf
C23	27pf
C24	27pf
C25	10mf
C26	10mf
C27	4,7mf
C28	47mf
C29	470pf
C30	10mf
C31	4,7mf
C32	100mf
C33	2,2µf
C34	10mf
C35	2,2µf
C36	4,7µf
C37	22pf
C38	470pf
C39	470pf
C40	10pf
C41	10mf
C42	10mf
C43	10mf
C44	10mf
C45	270pf
C46	270pf
C47	470pf
C48	68pf
C49	220pf
C50	82pf
C51	10mf

C52	~~15~~pf (82pf)
C53	~~15~~pf (82pf)
C54	470pf
C55	10mf
C56	10mf
C57	10mf
C58	470p
C59	100mf
C60	47mf
C61	470p
C62	10mf
C63	2,2µf
C64	10mf
C65	~~15pf~~ (82pf)
C66	470pf
C67	~~330pf~~ (150pf)
C68	4,7mf
C69	470pf
C70	10mf
C71	10mf
C72	2,2µf
C73	22pf
C74	2,2µf
C75	47mf
C76	100mf
C77	10mf
C78	10mf
C79	47µf
C80	22mf
C81	1000pf
C82	1000pf
C83	1000pf
C84	1000pf
C85	2,2µf
C86	22mf
C87	100mf
~~C88~~	~~100mf~~
C89	100mf
C90	100mf
C91	10mf
C92	100mf
C93	2,2µf
C94	2,2µf
C95	2,2µf
C96	100mf
C97	220µf
C98	100mf
C99	100mf
C100	100µf
C101	47µf
C102	100mf
C103	100mf
C104	10mf

– C105 : C134 : bypass 1nf

CA1	25pf
CA2	25pf
CA3	10pf
CA4	10pf
CA5	10pf
P1	5kΩ
P2	25kΩ
P3	500Ω
P4	500Ω
P5	100Ω
P6	1kΩ
Q1	BC109C
Q2	2N2369
Q3	2N2369
Q4	2N2369
Q5	2N2369
Q6	BC107
Q7	2N2907
Q8	2N2907
Q9	BF245
Q10	BF245
Q11	BF245
Q12	BF245
Q13	BF245
Q14	78L09
Q15	78L09
Q16	BD675
IC1	TDA2002
IC2	NE555
IC3	LM358
IC4	SO42P
IC5	SO42P
IC6	MC1350
IC7	MC1350
IC8	LM358
D1	1N4148
D2	1N4148
D3	1N4148
D4	HP2800/FH1100
D5	HP2800/FH1100
D6	BA243
D7	BA243
D8	1N4007
D9	1N4007
D10	1N4148
D11	1N4007

DJ9BV 70cm-Yagis

Improved version!

Rainer Bertelsmeier
DJ9BV
Gluecksburger Str. 20
2 Hamburg 50

Revised: 22.12.1987

1. Design Data

Design: DL6WU-Design (Computer simulated and verified)

Design-Frequency: 432.0 MHz (Optimum for SSB-Band 432-434 MHz)

Frequency/Gain characteristic:

Type: DJ9-70-7.7λ

	430	432	434	436	438	440
Gain [dBD]	16.2	16.4	16.5	16.6	16.6	16.5
F/B [dB]	27.5	28.3	28.3	26.6	24.3	22.3

Feed-Point Impedance: 200 Ohm with folded dipole (Typ. VSWR in Figure 1)

2. Mechanical Data

Boom: 20x20x2 mm square aluminium tubing

Elements: 4 mm diameter AlMg3 aluminium rods (i.e. welding rods!)

Driven Element: Folded Dipole 8 mm diameter 8x1 mm Al Tubing (Figure 3)

Balun: 240 mm Teflon cable RG142 B/U (Sleeve length!)

Element-Mount: Nylon rivets 61PR8 from Heyman Manufacturing (Figure 4)

Mechanical Dimensions
(DJ9BV)

Element	Length [mm]	Distance [mm]	Position [mm]	Remarks
R1..R4	400	---	0	4-er Reflector
DE	325	130	130	8 mm Diameter!
D1	310	55	185	
D2	306	125	310	
D3	302	150	460	
D4	299	175	635	
D5	297	195	830	
D6	294	210	1040	
D7	291	220	1260	
D8	287	230	1490	
D9	287	240	1730	
D10	287	250	1980	
D11	283	260	2240	
D12	283	270	2510	
D13	283	280	2790	
D14	280	280	3070	
D15	280	280	3350	
D16	280	280	3630	
D17	277	280	3910	
D18	277	280	4190	
D19	277	280	4470	
D20	275	280	4750	
D21	275	280	5030	DJ9-70-7.3λ
D22	275	280	5310	DJ9-70-7.7λ
D23	272	280	5590	
D24	272	280	5870	DJ9-70-8.5λ
D25	272	280	6150	
D26	269	280	6430	
D27	269	280	6710	
D28	269	280	6990	DJ9-70-10λ
D29	269	280	7270	
D30	266	280	7550	DJ9-70-11λ

Figure 1 (VSWR curve of DJ9-70-8.5λ):

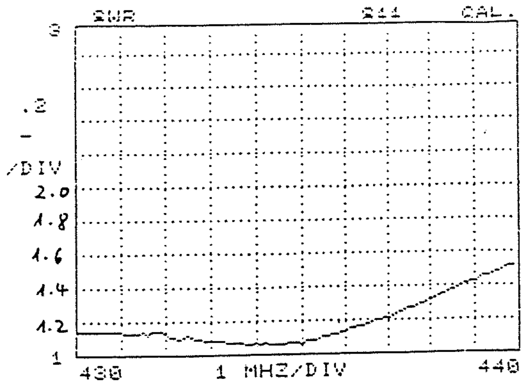
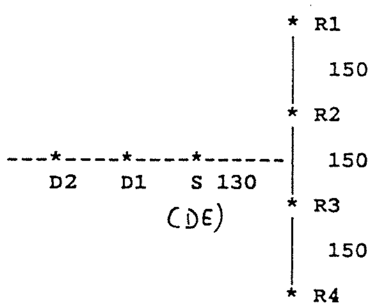


Figure 2 (Reflector arrangement):



3. Electrical data (@ 432.0 MHz)

Gain figures include 0.1 dB loss for RG142 balun.

Efficiency is typically 98.9 % or 3.2 ° K for antenna without balun.

Electrical data (Simulation by DJ9BV)

Type	Gain [dBD]	F/B [db]	1. Sidelobe [dB]	E-Angle [°]	H-Angle [°]	E-Stack. [m]	H-Stack. [m]
DJ9-70-7.3λ	16.1	24.9	-17.3	23.5	24.5	1.7	1.64
DJ9-70-7.7λ	16.3	28.3	-17.2	23.0	24.0	1.74	1.67
DJ9-70-8.5λ	16.6	23.8	-16.9	22.25	23.0	1.8	1.74
DJ9-70-10λ	17.3	29.5	-16.7	20.9	21.5	1.9	1.86
DJ9-70-11λ	17.5	24.7	-16.6	20.2	20.75	1.98	1.93

Figure 3 (Folded Dipole):

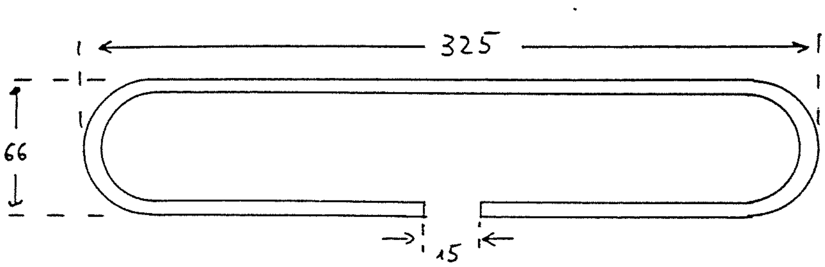
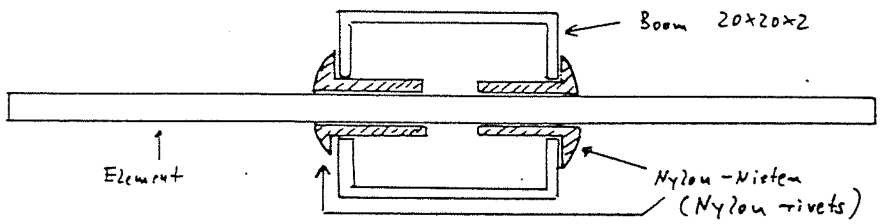
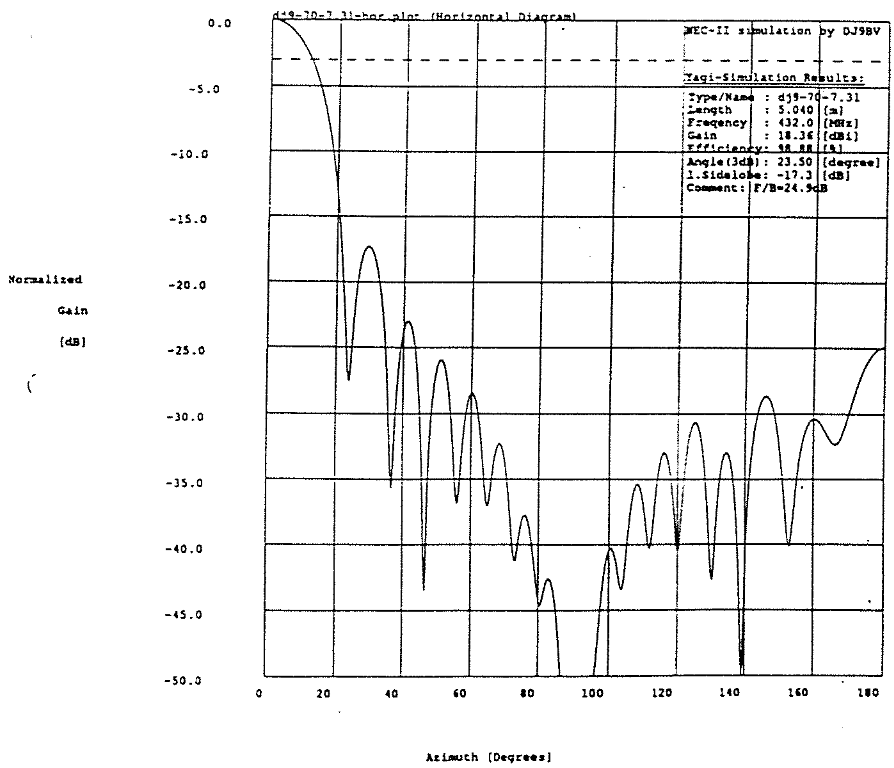


Figure 4 (Element Mounting):





Normalized

Gain

[dB]