TELEFUNKEN
SenderSysteme Berlin

MW- diplexer
567 kHz, 25 kW
855 kHz, 300 kW

Murcia
(Spain)

Technical Documentation

MW- diplexer Murcia (Spain) 567 kHz, 25 kW - 855 kHz, 300 kW

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Contents

1-0 Introduction

The antenna in Murcia (186 m high, base fed) is used by Radio National Espagna with two frequencies 567 kHz (25 kW) and 855 kHz (300 kW).

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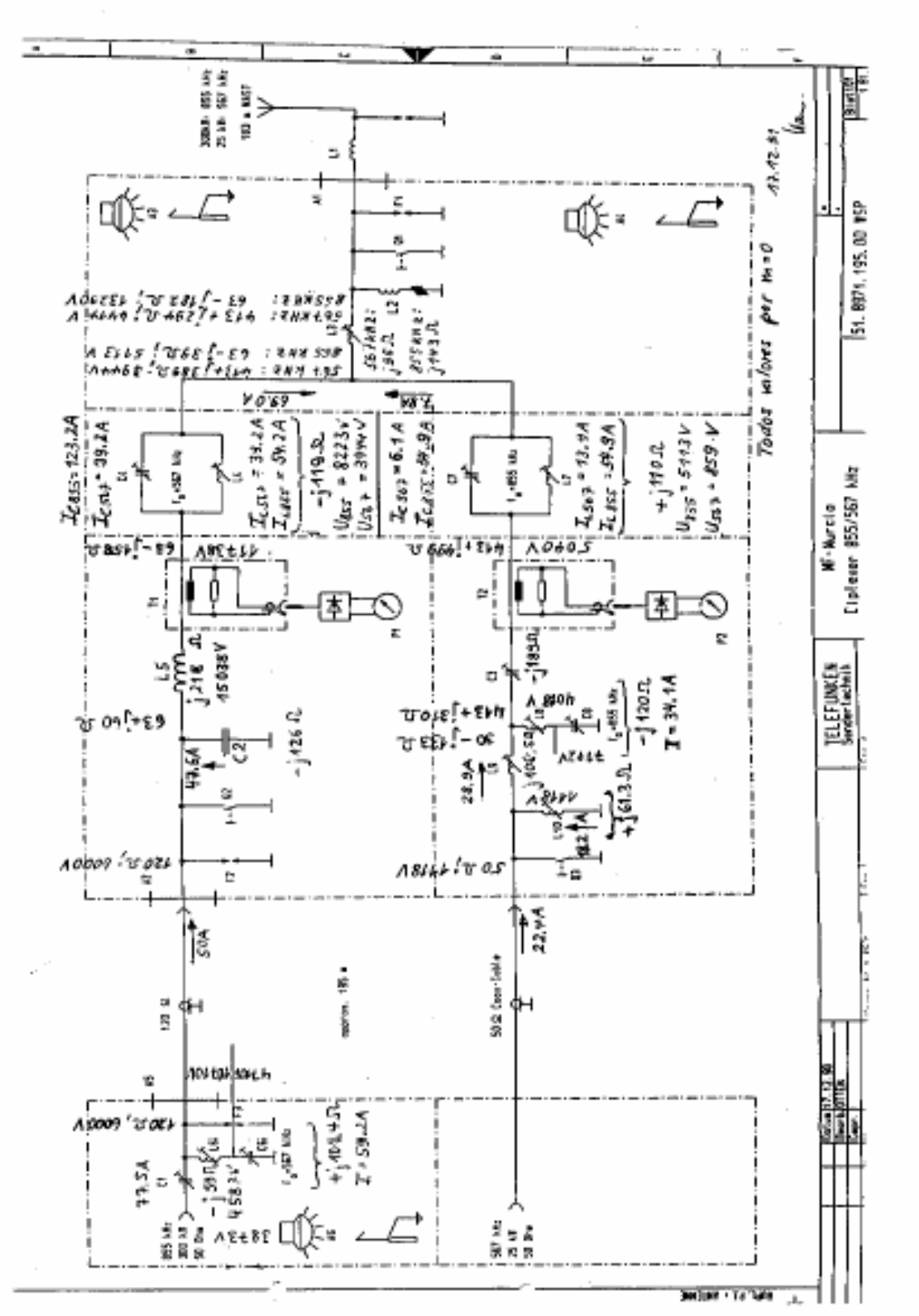
2-0 Design of antenna tuning unit as diplexer and operational values

The design of the antenna tuning unit as diplexer is shown next page. The document's name is 51-8900-813-00 WSP. All operational values like impedances, currents and voltages are given after tuning the elements.



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At the base of the antenna the coil L0 for protection against lightning is installed. Lightning current flowing from the mast into this coil increases the voltages at the spark gaps F1 and F2 (u = L • di/dt) avoiding damages of antenna tuning components by lightning.

3-0 Measuring documents dated 17th and 18th of December 1991

3-1 Measured values of impedances for 567 kHz and for 855 kHz

Waniewski / Wittling

OM/MW MURCIA

Protocolo de medidas/ Meßprotokoll

Medida de la impedancia a la base de la antena (la bobina de balisage inclusivo) / Messung der Impedanz am Fußpunkt der Antenne (einschließlich der Beleuchtungsdrossel)

f/kHz	R/Ohm	X/Ohm	X/Ohm f/MHz	f/kHz	R/Ohm	X/Ohm	X/Ohm f/MHz
855	63	-j 182	-j 213	567	413	+j 294	+j 518
854	64	-j 184	-j 216	566	409	+j 290	+j 513
853	64	-j 185	-j 217	565	408	+j 295	+j 522
852	65	-j 186	-j 218	564	392	+j 296	+j 525
851	65	-j 187	-j 220	563	390	+j 294	+j 522
850	66	-j 189	-j 222	562	388	+j 300	+j 534
856	64	-j 182	-j 213	568	414	+j 291	+j 512
857	63	-j 182	-j 212	569	425	+j 291	+j 512
858	63	-j 180	-j 210	570	428	+j 292	+j 512
859	62	-j 180	-j 209	571	434	+j 292	+j 512
860	61	-j 180	-j 209	572	440	+j 293	+j 512

Medida de la impedancia a la salida del emisor de TELEFUNKEN/ Messung der Impedanz am Ausgang des TELEFUNKEN- Senders

f/kHz	R/Ohm	X/Ohm	X/Ohm f/MHz
855	50	+j 2.6	+j 3.0
854	49.5	+j 1.7	+j 2.0
853	48.5	+j 0.0	+j 0.0
852	48	+j 0.0	+j 0.0
851	47	-j 1.3	-j 1.5
850	46.5	+j 0.0	+j 0.0
856	51.5	+j 0.9	+j 1.0
857	52	+j 1.3	+j 1.5
858	52	+j 0.0	+j 0.0
859	54	-j 1.7	-j 2.0
860	54	-j 1.7	-j 2.0

Medida de la impedancia al cable de 50 Ohm en la cabina de la antena / Messung der Impedanz am 50-Ohm-Kabel im Antennenhaus

f/kHz	R/Ohm	X/Ohm	X/Ohm f/MHz	S / 50Ω
567	50	+j 0	+j 0	1.00
566	52	+j 1.7	+j 3	1.05
565	56	+j 5.7	+j 10	1.17
564	59	+j 10.7	+j 19	1.29
563	60	+j 12.9	+j 23	1.35
562	62	+j 19.7	+j 35	1.54 sehr schmalbandig
568	48	-j 2	-j 3.5	1.06
569	44	-j 4	-j 7	1.17
570	40	-j 5.7	-j 10	1.25
571	37	-j 6.3	-j 11	1.40
572	35	-j 6.9	-j 12	1.48

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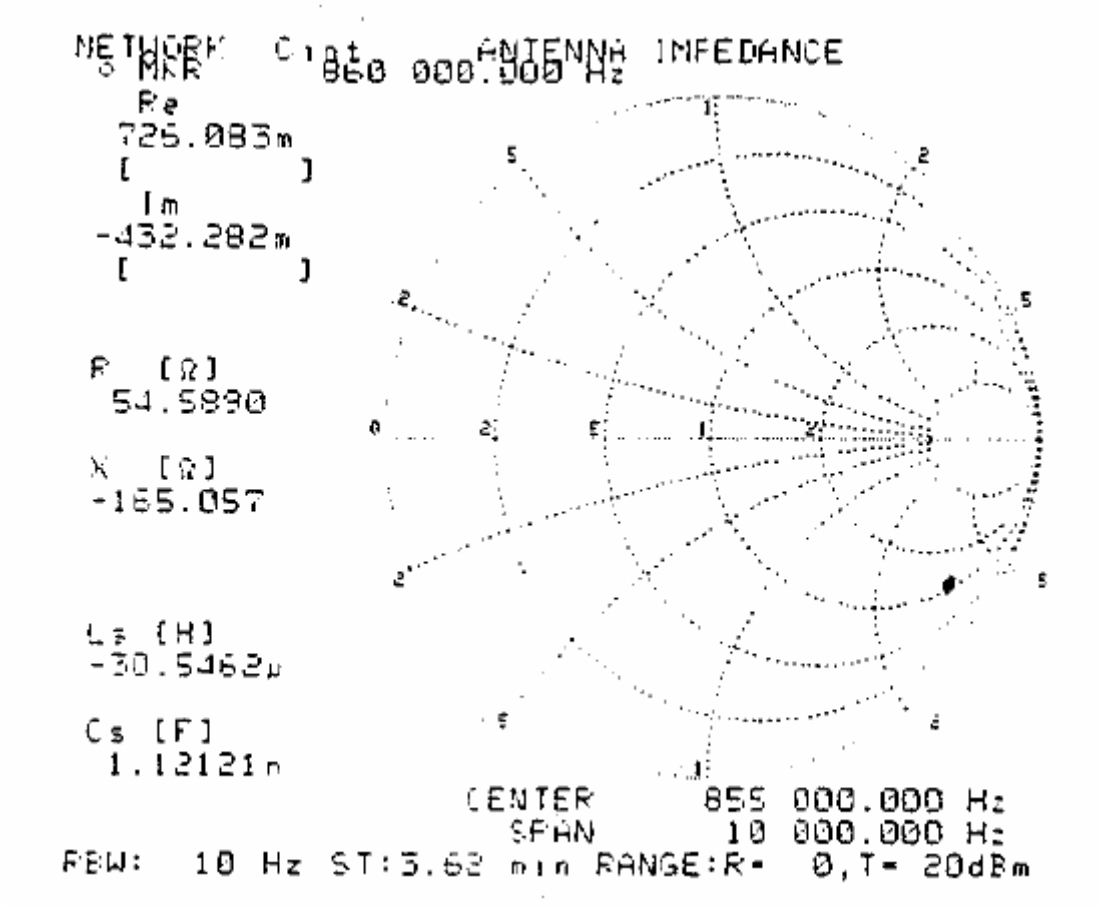

Antenna impedance 855 kHz

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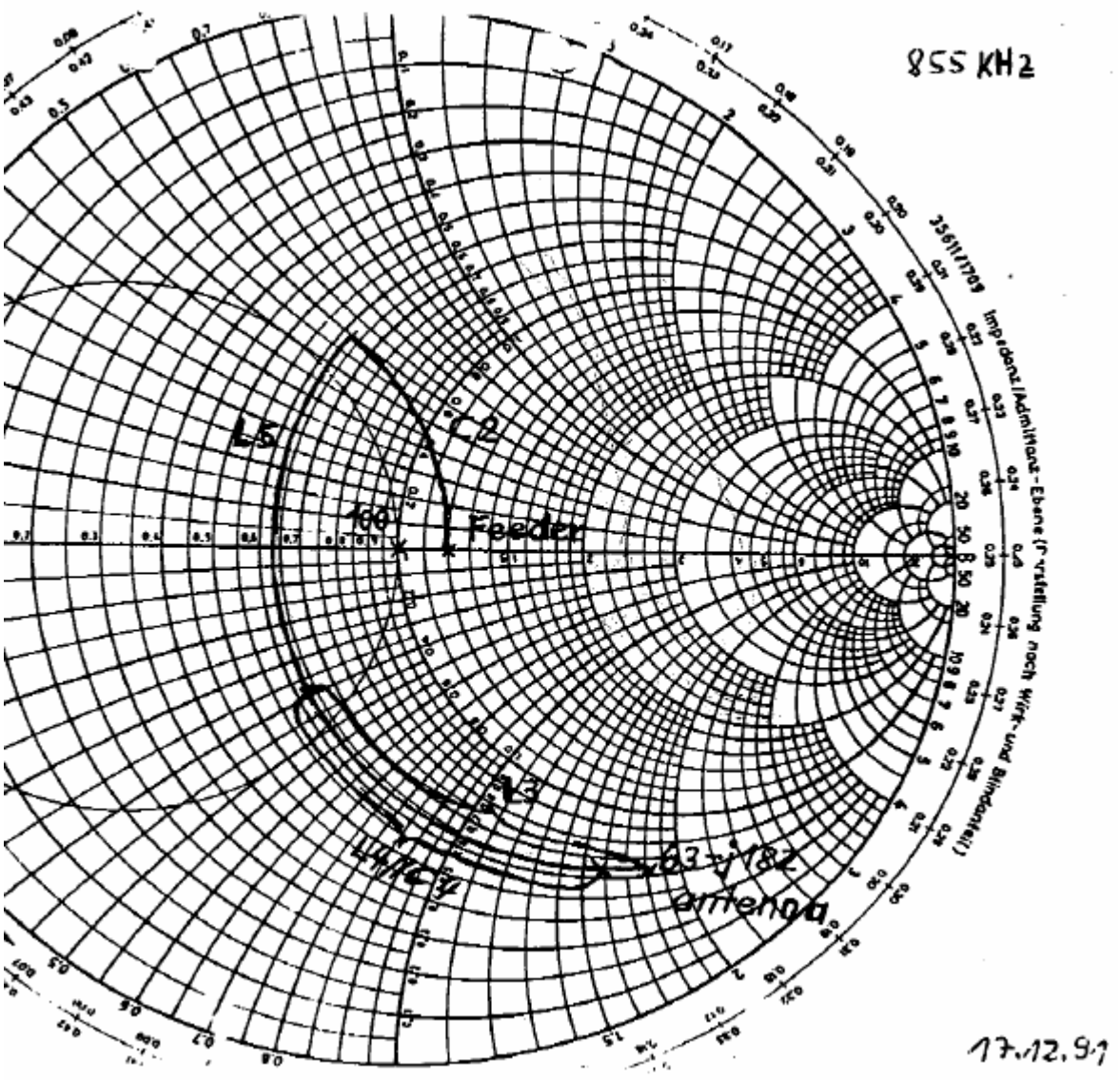
3-2 Tuning of the frequency 855 kHz



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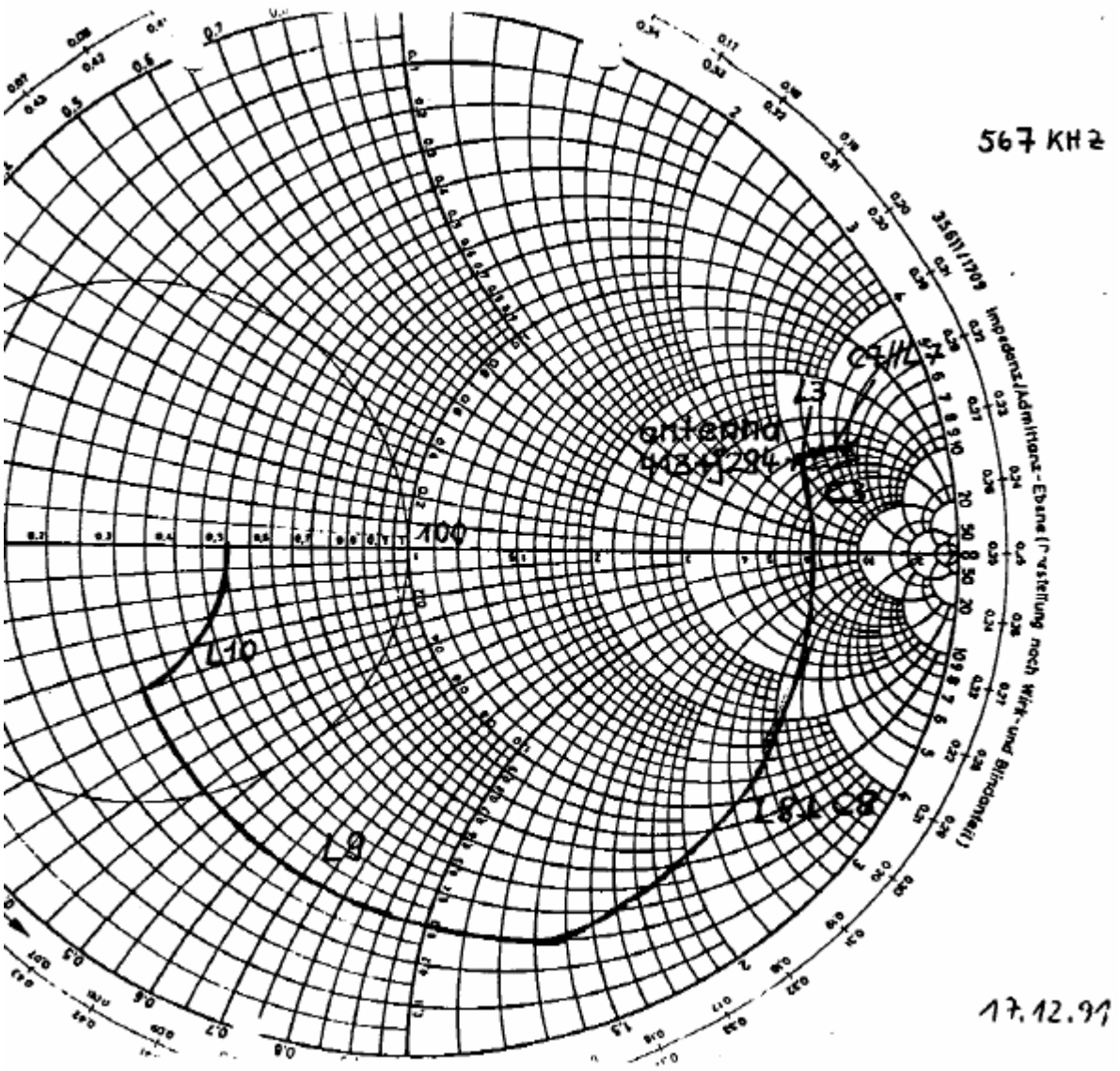
3-3 Tuning of the frequency 567 kHz



3-4 Coils and condensors, operational settings

Valores ajustados/Einstellwerte

Condensadores/Kondensatoren

C1: 5 * 1600 pF + 1 * 400 pF + 1 * 200 pF
en serie/ in Serie
5 * 1600 pF + 1 * 400 pF + 1 * 200 pF
en serie/ in Serie
4 * 1600 pF + 1 * 400 pF + 1 * 200 pF

C2: 5 * 1000 pF + 2 * 500 pF
en serie/ in Serie
5 * 1000 pF + 2 * 500 pF
en serie/ in Serie
6 * 1000 pF + 2 * 500 pF

C3: 3 * 800 pF + 1 * 400 pF + 1 * 200 pF
en serie/ in Serie
3 * 800 pF + 1 * 400 pF + 1 * 200 pF

C4: 7 * 1200 pF + 1 * 800 pF + 2 * 400 pF + 1 * 200 pF
en serie/ in Serie
7 * 1200 pF + 2 * 800 pF + 2 * 400 pF
en serie/ in Serie
8 * 1200 pF + 2 * 800 pF + 2 * 400 pF
en serie/ in Serie
7 * 1200 pF + 1 * 1000 pF + 2 * 800 pF + 2 * 400 pF

C6: 4 * 1600 pF + 1 * 400 pF + 1 * 200 pF
en serie/ in Serie
3 * 1600 pF + 1 * 400 pF + 1 * 200 pF
en serie/ in Serie
4 * 1600 pF + 1 * 500 pF + 1 * 400 pF

C7: 5 * 1000 pF + 2 * 500 pF
en serie/ in Serie
5 * 1000 pF + 2 * 500 pF
en serie/ in Serie
5 * 1000 pF + 2 * 500 pF

C8: 3 * 1000 pF + 2 * 500 pF
en serie/ in Serie
3 * 1000 pF + 2 * 500 pF
en serie/ in Serie
3 * 1000 pF + 2 * 500 pF

C20: 4 * 800 pF + 2 * 160 pF
en serie/ in Serie
3 * 800 pF + 1 * 200 pF + 2 * 160 pF

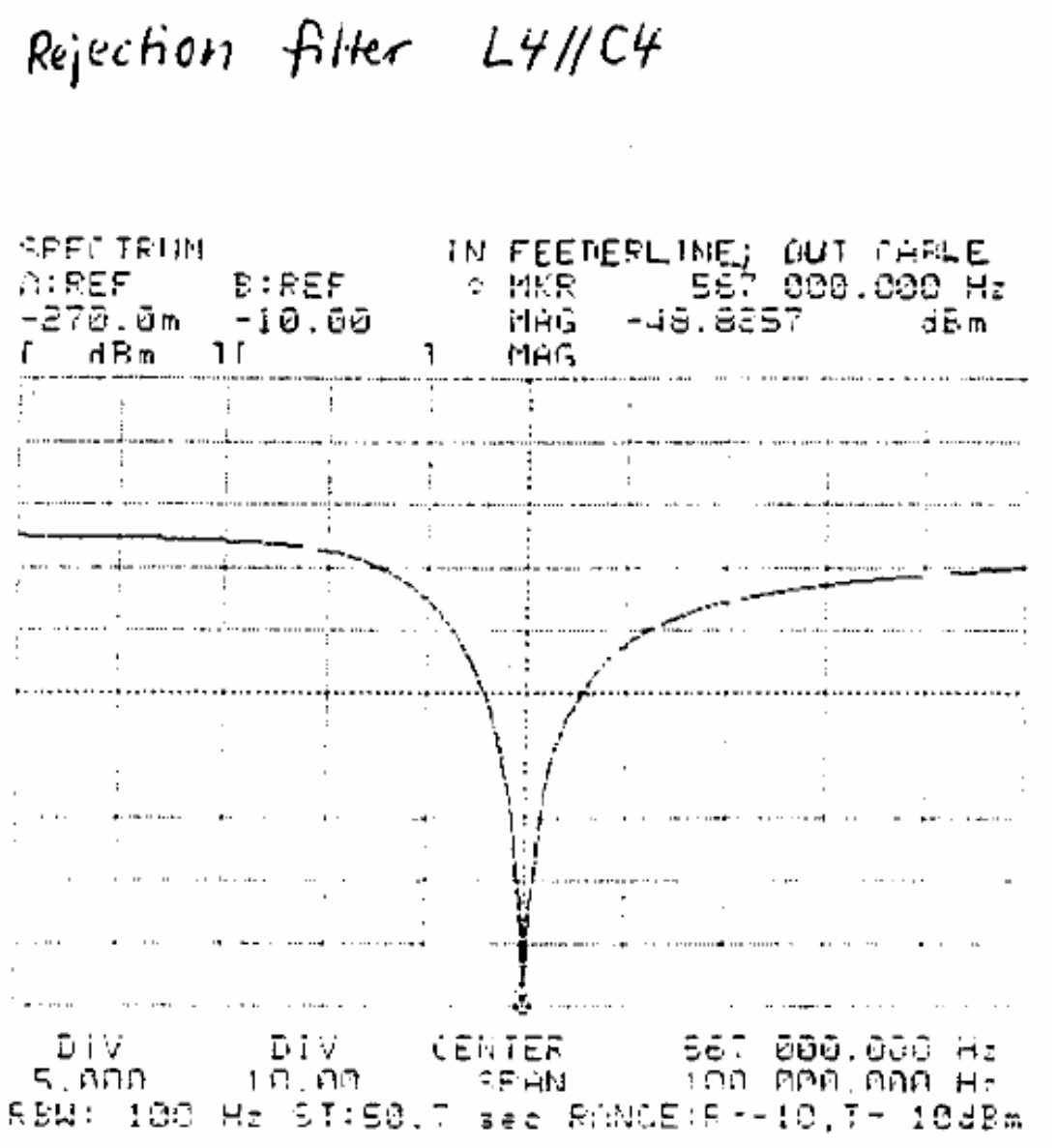
Bobinas/Spulen:

L3: n=10.76 L4: n=10.25 (completo/voll) L5: n=12.55 L6: n=12.55
L7: n=9.45 L8: n=12.1 L9: n=11.3 L10: n=6.3

3-5 Decoupling by filters

The measurement of the following filters has been carried out:

- **Filters for fo = 567 kHz**



Input at feeder line, output at cable

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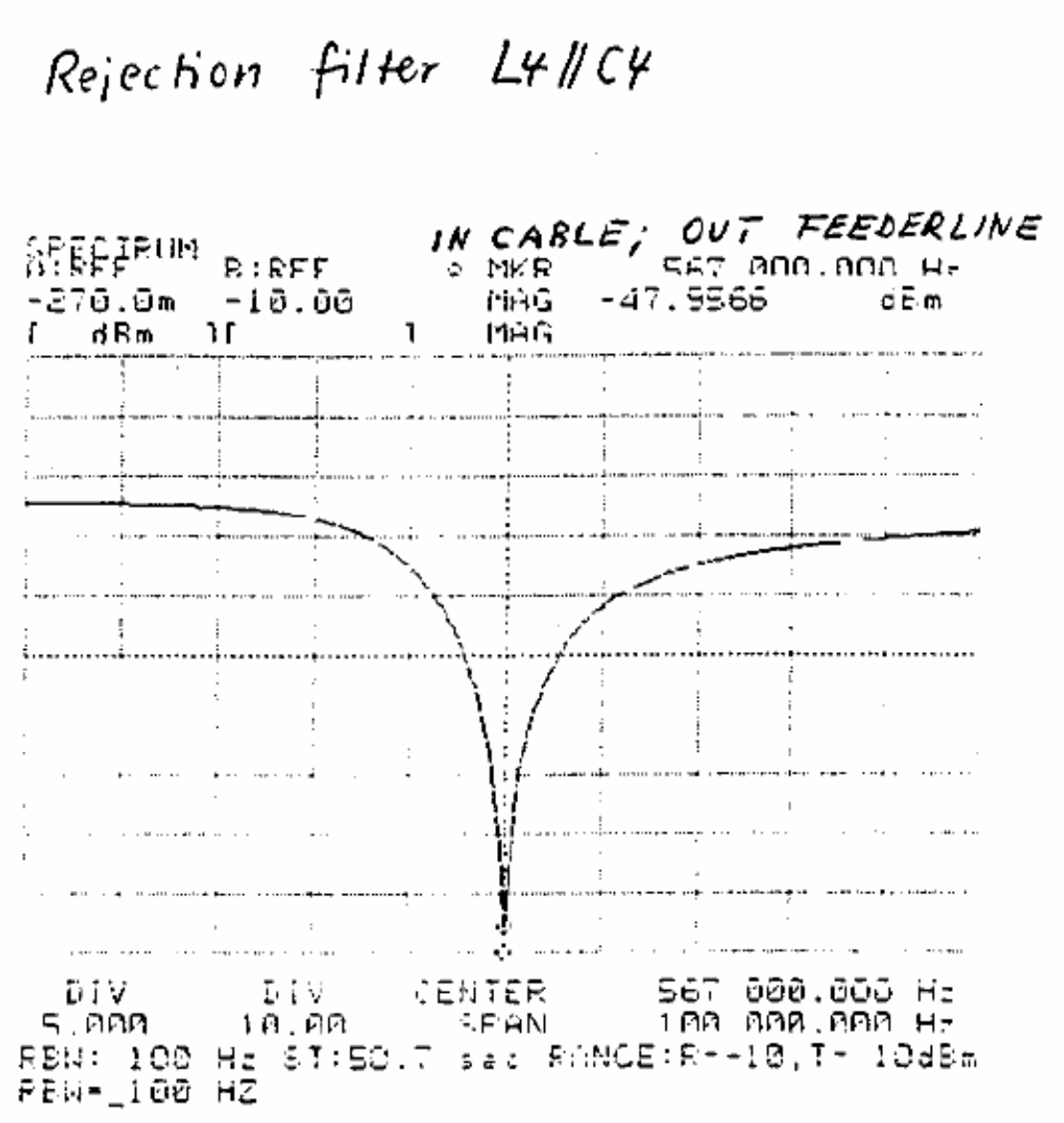

Input at cable, output at feeder line

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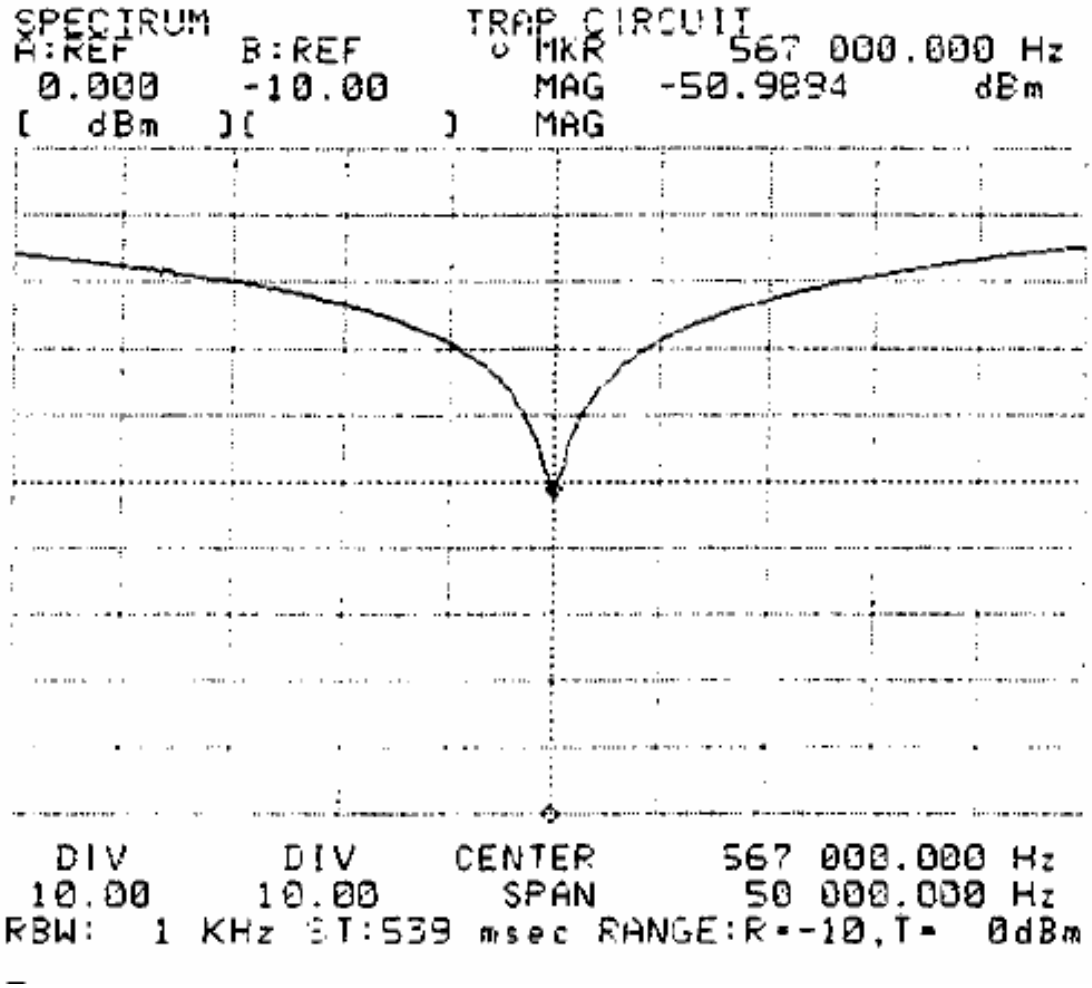
TRAP FILTER L6 ⊥ C6



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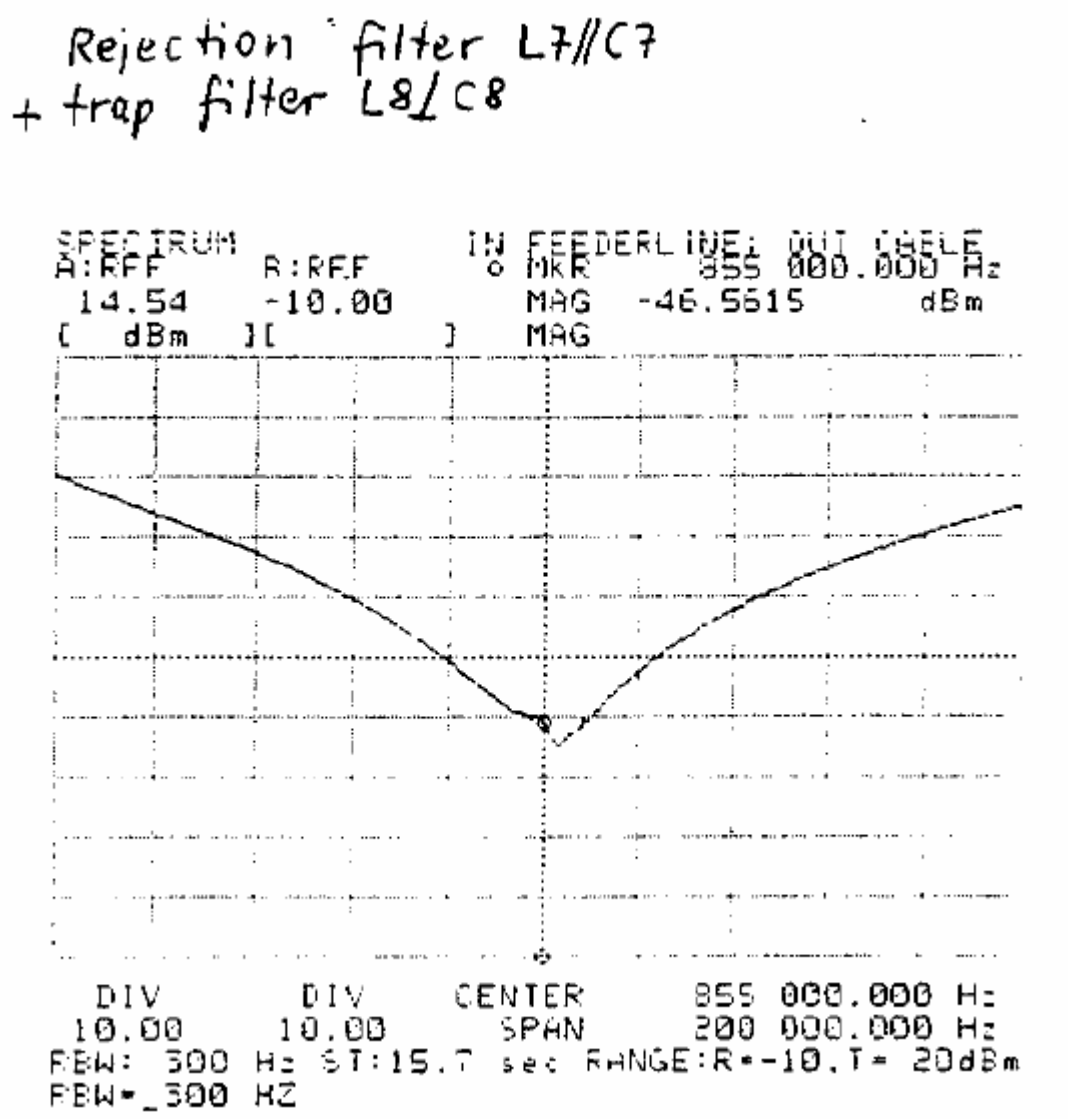
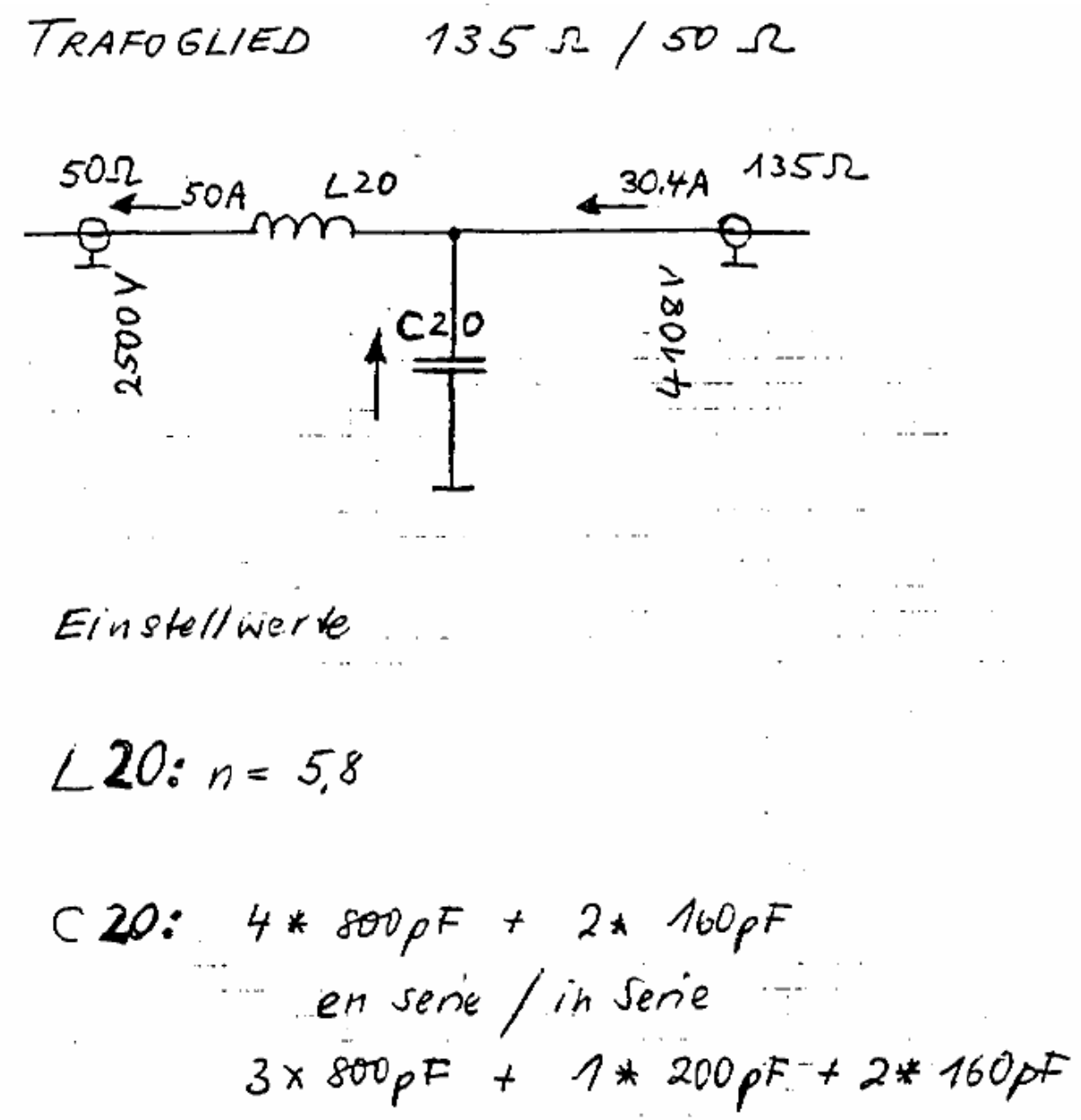
- **Filters for fo = 855 kHz**



Input at feeder line, output at cable

3-6 Circuit of transformation 135 ohms/ 50 ohms



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4-0 Supplementary measuring documents dated 26nd and 27nd of February 1991

27.02.92
TELEFUNKEN Sendertechnik GmbH
Waniewski / Wittling

OM/MW MURCIA

Suplemento al/ Ergänzung zum
protocolo de medidas/ Meßprotokoll
del 18-12-91/ vom 18.12.91

1. Medida de la impedancia a la base de la antena de 500 kHz a 1000 kHz (la bobina de balisage inclusive) / Messung der Impedanz an dem Fußpunkt der Antenne von 500 kHz bis 1000 kHz (einschließlich der Beleuchtungsdrossel)

2. Medida de la impedancia a la salida del emisor de TELEFUNKEN/ Messung der Impedanz am Ausgang des TELEFUNKEN- Senders

3. Medida de la impedancia al cable de 50 Ohm en la cabina de la antena / Messung der Impedanz am 50-Ohm-Kabel im Antennenhaus

4. Filtro L4//C4 para 567 kHz / Filter L4//C4 für 567 kHz

5. Filtros L7,C7 y L8,C8 para 855 kHz / Filter L7,C7 und L8,C8 für 855 kHz

6. Valores ajustados/Einstellwerte

7. Plano electrico de la bobina de balisage/ Elektrische Schaltung der Beleuchtungsdrossel

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1. Medida de la impedancia a la base de la antena de 500 kHz a 1000 kHz (la bobina de balisage inclusivo) / Messung der Impedanz an dem Fußpunkt der Antenne von 500 kHz bis 1000 kHz (einschließlich der Beleuchtungsdrossel)

Ver tambien Smith chart adjunto/Siehe auch beiliegende Smith chart

f/kHz	R/Ohm	X/Ohm	X/Ohm f/MHz	f/kHz	R/Ohm	X/Ohm	X/Ohm f/MHz
567	420	j 295	j 520	700	320	-j 357	-j 510
855	63	-j 182	-j 213	720	248	-j 342	-j 475
500	160	j 227	j 454	755	168	-j 302	-j 400
520	213	j 260	j 500	780	124	-j 269	-j 345
540	280	j 289	j 536	810	91	-j 224	-j 277
560	375	j 297	j 530	840	70	-j 196	-j 233
580	500	j 261	j 450	880	53	-j 154	-j 175
600	616	j 159	j 265	910	44	-j 125	-j 137
620	680	-j 11	-j 17	940	37	-j 102	-j 108
645	616	-j 216	-j 335	970	32	-j 77	-j 79
670	470	-j 324	-j 483	1000	31	-j 53	-j 53

)

2. Medida de la impedancia a la salida del emisor de TELEFUNKEN/ Messung der Impedanz am Ausgang des TELEFUNKEN- Senders

f/kHz	R/Ohm	X/Ohm	X/Ohm f/MHz
855	50	+j 0.9	+j 1.0

3. Medida de la impedancia al cable de 50 Ohm en la cabina de la antena / Messung der Impedanz am 50-Ohm-Kabel im Antennenhaus

f/kHz	R/Ohm	X/Ohm	X/Ohm f/MHz
567	50	+j 0	+j 0

4. Filtro L4//C4 para 567 kHz / Filter L4//C4 für 567 kHz

Ver plot adjunto/ Siehe beiliegenden Plot

5. Filtros L7,C7 y L8,C8 para 855 kHz / Filter L7,C7 und L8,C8 für 855 kHz

Ver plot adjunto/ Siehe beiliegenden Plot

6. Valores ajustados/Einstellwerte

Condensadores/Kondensatoren

C1: 5 * 1600 pF + 1 * 400 pF + 1 * 200 pF
en serie/ in Serie
5 * 1600 pF + 1 * 400 pF + 1 * 200 pF
en serie/ in Serie
4 * 1600 pF + 1 * 400 pF + 1 * 200 pF

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 C2:    5 * 1000 pF + 2 * 500 pF
          en serie/ in Serie
        6 * 1000 pF
          en serie/ in Serie
        6 * 1000 pF + 2 *  500 pF

 C3:    3 *  800 pF + 1 *  400 pF + 1 * 200 pF
               en serie/ in Serie
        3 *  800 pF + 1 *  400 pF + 1 * 200 pF

 C4:    6 * 1200 pF + 3 *  800 pF + 2 * 400 pF
               en serie/ in Serie
        7 * 1200 pF + 2 *  800 pF + 2 * 400 pF + 1 * 200 pF
               en serie/ in Serie
        8 * 1200 pF + 1*1000 pF + 1 *  800 pF + 2 * 400 pF
               en serie/ in Serie
        7 * 1200 pF + 2 * 1000 pF + 1 *  800 pF + 2 * 400 pF

 C6:    4 * 1600 pF + 1 *  400 pF + 1 * 200 pF
               en serie/ in Serie
)       3 * 1600 pF + 1 *  400 pF + 1 * 200 pF
               en serie/ in Serie
        4 * 1600 pF + 1 *  500 pF + 1 * 400 pF

 C7:    5 * 1000 pF + 2 *  500 pF
          en serie/ in Serie
        5 * 1000 pF + 2 *  500 pF
          en serie/ in Serie
        5 * 1000 pF + 2 *  500 pF

 C8:    3 * 1000 pF + 2 *  500 pF
          en serie/ in Serie
        3 * 1000 pF + 2 *  500 pF
          en serie/ in Serie
        3 * 1000 pF + 2 *  500 pF

 C20:   4 *  800 pF + 2 *  160 pF
          en serie/ in Serie
        3 *  800 pF + 1 *  200 pF + 2 * 160 pF
)
 Bobinas/Spulen:

 L3: n=10.76  L4: n=10.25 (completo/voll)  L5: n=12.55  L6: n=12.55
 L7: n=9.58  L8: n=12.1  L9: n=11.75  L10: n=5.62


 7. Plano electrico de la bobina de balisage/ Elektrische Schaltung
    der Beleuchtungsdrossel

 Ver dibujo adjunto/ Siehe beiliegende Zeichnung
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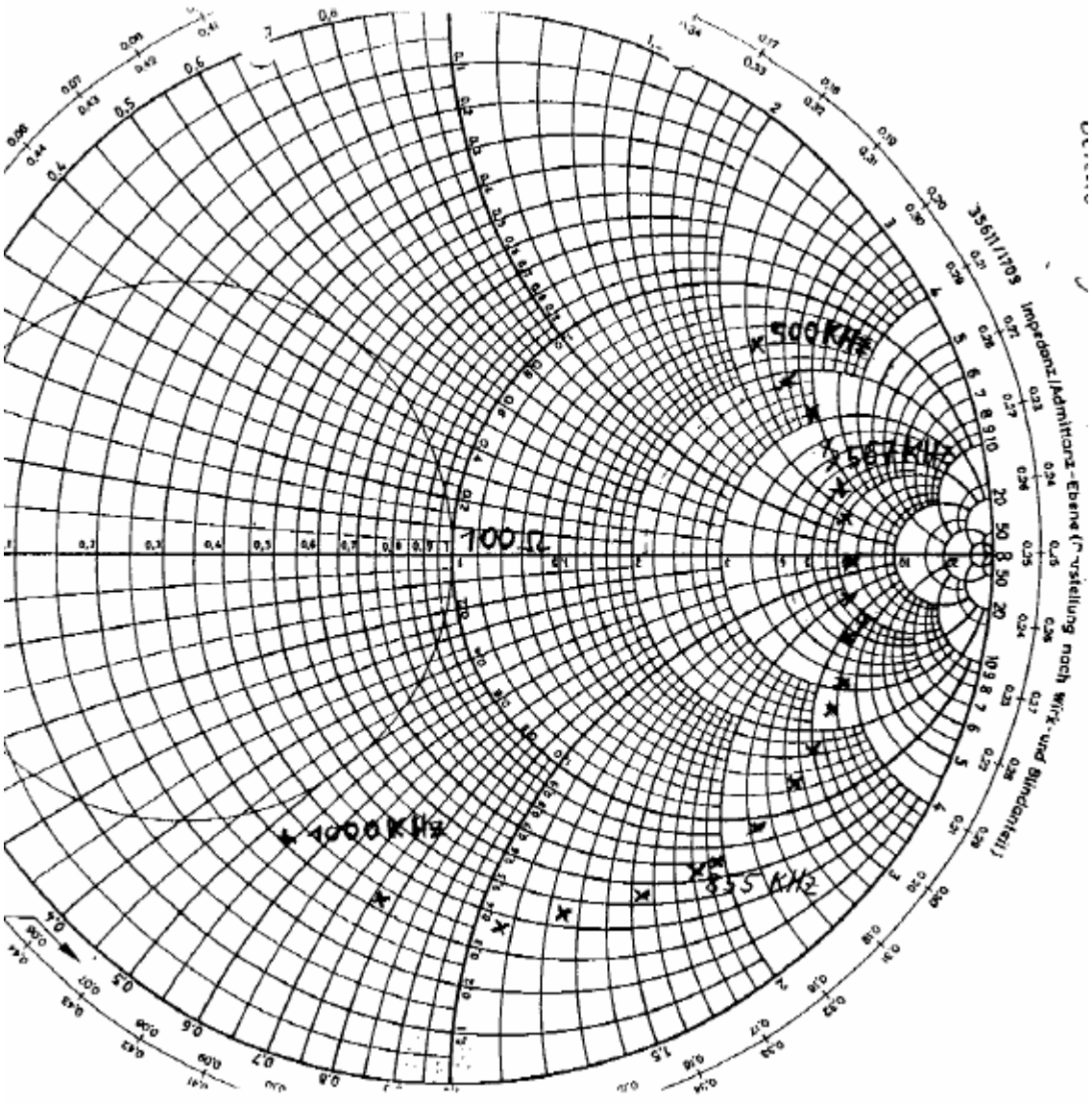
Impedancia a la base de la antena de 500 kHz a 1000 kHz (la bobina de balisage inclusivo) / Fußpunktimpedanz der Antenne von 500 kHz bis 1000 kHz (einschließlich Beleuchtungsdrossel)



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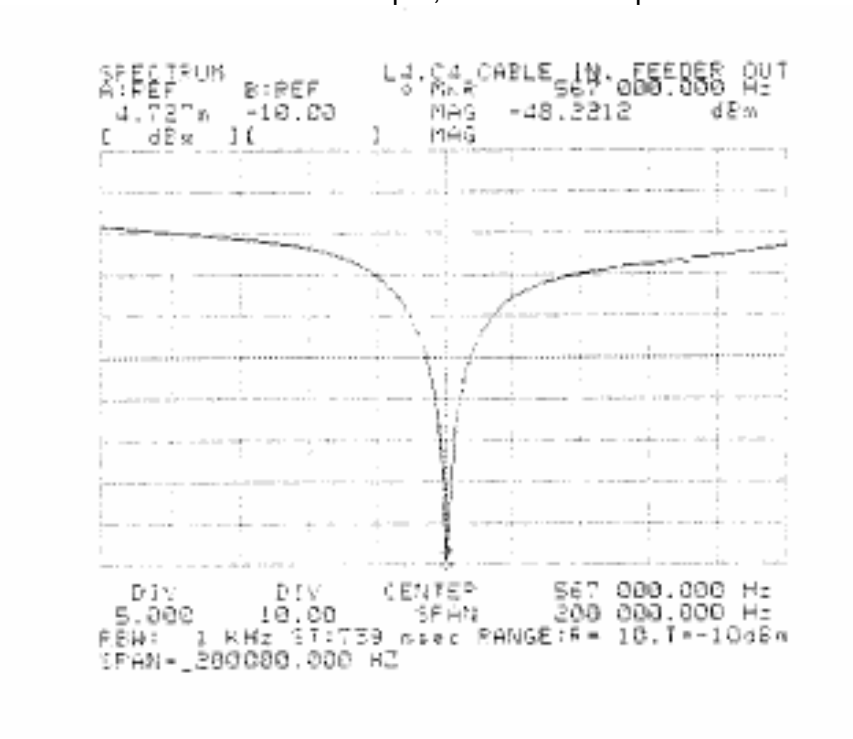
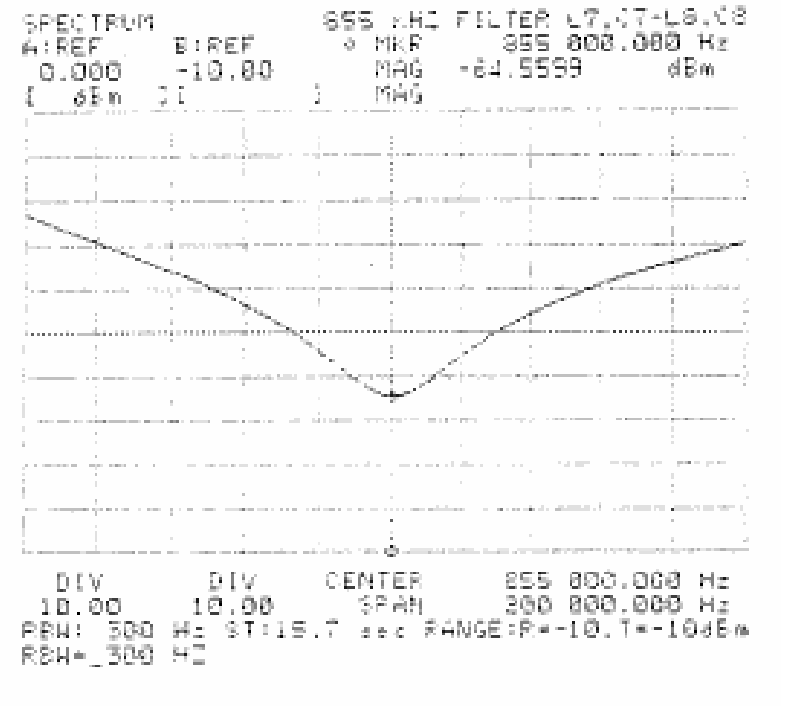
Filter L4//C4 567 kHz: cable input, feeder line output



Filter L4//C4 855 kHz:



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Electrical design of choke for obstruction light: