

The Spectrum below 153 kHz

Oct 04/2000

Location 50d 00m 43s North
Maidenhead

08d 26m 41s East
jo40fa

Gamal Soegiono
Reichenberger Str.36
65479 Raunheim
Germany

#	Hz	dBm	IF-BW	bearing	station	remarks
48	11k905	-108 (h) -105 (o) -105 (p)	50	-	Navigation System RSDN-20 Krasnodar, 45N02 38E39 Novosibirsk, 55N04 82E58 Komsomolsk na Amure, 50N34 136E58 all 57dBW, 100 Hz A1A	dash, pause, dot dot dot, pause
47	12k649	-110 (h) -104 (o) -105 (p)	50	-	Navigation System RSDN-20 Krasnodar, 45N02 38E39 Novosibirsk, 55N04 82E58 Komsomolsk na Amure, 50N34 136E58 all 57dBW, 100 Hz A1A	dash, pause, dash, long pause
46	14k881	-103 (h) -105 (o) -106 (p)	50	-	Navigation System RSDN-20 Krasnodar, 45N02 38E39 Novosibirsk, 55N04 82E58 Komsomolsk na Amure, 50N34 136E58 all 57dBW, 100 Hz A1A	dash, pause, dash, pause, dash, long pause
45	16k0	-78 (i) -75 (j) -76 (k) -72 (l) -68 (n) -75 (o) -76 (p)	200	-	Possibly GBR, Rugby, 52N22 01W11 58.1dBW, 100 Hz A1A, 150 Hz F1B	MSK type B 719km/295deg
	16k45	-84 (g) -92 (n)	200	-	not identified	2-Tone-FSK
44	18k3	-97 (h) -84 (k) -71 (l) -97 (n) -60 (p)	200	-	Possibly VTX, Vijayanarayanam, 08N27 77E45, 60dBW, 100 Hz A1A, 100 Hz F1B	2-Tone-FSK type A, CW 7812km/101deg
43	19k6	-76 (h) -78 (n) -76 (o) -78 (p)	200	-	Possibly GBZ, Criggion, 52N43 03W04 56.8dBW, 100 Hz A1A, 200 Hz F1B	MSK type A 853km/295deg
42	19k8	-88 (i) -88 (k) -96 (l) -92 (o) -93 (p)	200	-	not identified	MSK type A
41	20k27	-72 (n) -78 (o) -77 (p)	200	-	Possibly ICV, Tavolara, 40N55 09E45 57dBW, 100Hz A1A, 200 Hz F1B	MSK type A 1016km/174deg
40	20k9	-67 (i) -60 (n) -67 (p)	200	-	Possibly HWU, Le Blanc, 46N37 01E05 23dBW, 300 Hz F1B	MSK type A 601km/247deg
39	22k2	-100 (i) -93 (j) -97 (l) -97 (o)	200	-	not identified, (NAH New York, NAD Boston, NSS Annapolis, GBR Rugby, GBZ Criggion, GQD Anthorn)	MSK type A
38	23k4	-59 (i) -60 (j) -67 (k) -96 (k*) -76 (n) -60 (o) -65 (p)	200	351	DHO or DHO38, Ramsloh alias Rhauderfehn 53N05 07E40, 40/50dBW, 200 Hz G7D, 100 Hz F1B, 100 Hz A1A	MSK type A 344km/351deg

#	Hz	dBm	IF-BW	bearing	station	remarks
37	24k0	-84 (i) -78 (j) -81 (k) -77 (l) -70 (n) -79 (p)	200	125/305	not identified, (NLK OsoWash, NSS Annapolis, NLK SeattleWash,)	MSK type A
	25k2	-86 (l) -82 (n)	200	-	not identified	
	26k7	-74 (j)	200	130/310	not identified	
36	37k5	-68 (i) -69 (j) -70 (k) -71 (l) -73 (n) -70 (o) -69 (p)	200	143/323	Possibly TFK, Keflavik, 63N57 22W28 47dBW, 100 Hz A1A, 600 Hz F1B	MSK type A 2388km/322deg
	40k8	-80 (h) -90 (j) -87 (l) -81 (n)	200	90/270 +/-20 !!	not identified (NSS Washington DC, NPG S.Francisco, NPL S.Diego, NAM Norfolk, GXH Thurso, NST Londonderry	Multitone-FSK
35	45k9	-65 (i) -68 (j) -65 (k) -63 (l) -60 (n) -69 (o) -68 (p)	200	160/340	not identified (CFH, Halifax on 45k75)	MSK type A
	46k92	-88 (e) -85 (k) -95 (l)	200	-	External EMI ???	
34	49k0	-77 (i) -85 (j) -83 (k) -79 (l) -80 (o) -82 (p)	200	145/325	Possibly SXA, Agmarina Attik, 38N11 24E04 50dBW, 100 Hz A1A, 1kHz F1B	MSK type A 1806km/131deg
33	51k95	-67 (i) -75 (j) -68 (k) -73 (l) -68 (n) -73 (o) -73 (p)	200	147/327	not identified, (GYW1 Crimond, GIY20 Oxford)	2-Tone-FSK type A
32	53k0	-65 (i) -68 (j) -75 (k) -80(l) -71 (n) -70 (o) -72 (p)	200	165/345	Possibly MBR, London, 51N30 00W10 44dBW, 100 Hz A1A, 300 Hz F1B	2-Tone-FSK type A 628km/289deg
31	53k425	-81 (i) -82 (n) -88 (o) -93 (p)	200	-	Possibly TBG, Canakkale, 40N06 26E26 47dBW, 177 Hz F1B	2-Tone-FSK type A 1783km/121deg
	53k7	tbd (h)	200	-	Possibly RTO, Moskva, 55N45 37E38 50dBW, 100 Hz A1A, 6kHz B8E	FSK 2040km/61deg
	54k0	-83 (h)	200	-	External EMI ??? sounds like Multitone-FSK	
	56k35	-70 (e)	200	-	Possibly GLP20, Ongar, 51N43 00E11 44dBW, 300 Hz A1B, 300 Hz F1B	FSK 610km/291deg
	57k4	-83 (i) -80 (j) -80 (k) -75 (l)	200	150/330	not identified, (GXH Thurso, NRK Grindavik, CNL Kenitra)	2-Tone-FSK type B

#	Hz	dBm	IF-BW	bearing	station	remarks
30	57k7	-80 (i) -85 (j) -87 (k) -80 (l) -88 (n) -82 (o) -83 (p)	200	0/180	Possibly LBH, Trondheim, 63N25 10E30 47.8dBW, 100 Hz A1A, 130 Hz F1B	2-Tone-FSK type B 1794km/4deg
29	60k000	-78 (i) -67 (j) -64 (k) -63 (l) -61 (n) -72 (o) -70 (p)	50	122/302	Standard time&frequency MSF, Rugby, 52N22 01W11 49 dBW, 500 Hz A1B	719km/295deg
28	61k825	-72 (i) -72 (k) -70 (l) -71 (n) -71 (o) -79 (p)	200	128/308	Possibly GIZ20, Inskip, 53N43 02W47 41.8 dBW, 100 Hz A1A, 300 Hz J7B, 250 Hz F1B	2-Tone-FSK type A 872km/302deg
27	62k6	-68 (i) -70 (k) -60 (l) -67 (n) -61 (o) -60 (p)	200	35/215	not identified, (FUO Toulon, FUG La Regine, FUC Cherbourg, FUE Brest)	MSK
26	64k55	-94 (f) -87 (o) -95 (p)	200	-	Possibly GBV20, Rugby, 52N22 01W11 47.8dBW, 1k5 A1B, 350 Hz F1B	2-Tone-FSK type A 719km/295deg
	65k8	-85 (i) -64 (k) -78 (l)	200	90/270	Possibly FUE, Brest, 48N25 04W14 41.8dBW, 100 Hz A1A, 300 Hz F1B	Multitone-FSK 936km/264deg
25	66k67	-82 (i) -83 (k) -92 (l) -82 (n) -90 (o) -84 (p)	50	-	Standard time&frequency, RBU time ticks on 66k97 !!	
24	68k0	-70 (i) -75 (k) -70 (l) -66 (n) -77 (p)	200	-	Possibly GBY20, Rugby, 52N22 01W11 49dBW, 100 Hz A1A, 500 Hz F1B	2-Tone-FSK type A 719km/295deg
23	68k9	-62 (i) -65 (n) -66 (o) -69 (p)	200	-	not identified	2-Tone-FSK type A
22	73k17	-70 (i) -64 (k) -69 (l) -69 (n) -78 (o) -76 (p)	200	-	not identified	2-Tone-FSK type A
21	75k0	-77 (i) -75 (k) -76 (l) -70 (n) -76 (o) -75 (p)	200	15/195	Standard time&frequency HBG, Geneveprangins, 46N24 01E15 46dBW, 400 Hz A1B, 400 Hz F1B	668km/236deg
20	77k500	-42 (i) -39 (k) -41 (l) -37 (n) -40 (o) -42 (p)	50	-	Standard time&frequency DCF 77 Mainflingen, 50N01 09E00 [DET]	39km/90deg

#	Hz	dBm	IF-BW	bearing	station	remarks
19	81k0	-76 (i) -73 (k) -68 (l) -73 (n) -71 (o) -86 (p)	200	133/313	Possibly GYN2, London, 51N30 00W10 46 dBW 100 Hz A1A, 43dBW 190 Hz F1B	2-Tone-FSK type A
18	82k75	-76 (i) -71 (k) -82 (l) -63 (n) -80 (o) -76 (p)	200	145/325	not identified (GYB London, GYW Gibraltar)	2-Tone-FSK type A
	100	-87 (e) -86 (e) -83 (e) -79 (e) -76 (e) -76 (e)	200 300 500 1000 1800 3000	-	Multiple LORAN stations	
	106k075	-90 (i)	50	-	EMI	Data network
17	118k8	-81 (h) -88 (o) -87 (p)	200	-	Possibly GYE, London, 51N30 00W10 46dBW 100 Hz A1A, 41.5dBW 190 Hz F1B	2-Tone-FSK type A 628km/289deg
16	122k500	-60 (i) -56 (n) -61 (o) -61 (p)	50	-	DCF 42, DGPS signal, Mainflingen [DET]	Pilot tone
15	128k930	-35 (i) -31 (n) -35 (o) -35 (p)	50	-	DCF 49, RC signal, Mainflingen [DET]	mark frequency
	129k8	-87 (m)	200	-		FSK
	129k440 129k570	-76 (g)	200	-	SOA212, Warsaw Meteo, 52N09 21E18	FSK 927km/70deg
14	131k7647	-89 (i) -86 (k) -85 (l) -89 (o) -90 (p)	200	-	»datatrak« station	CW bursts
	132k960 through 134k160			-	Mainflingen Intermodulation Product	2*mark(DCF49)- modulation(DCF42)
13	133k25	-95 (i) -96 (k) -92 (l)	200	-	»datatrak« station	CW bursts
12	135k360	-96 (i) -89 (o) -90 (p)	50	-	Mainflingen Intermodulation Product	2*mark(DCF49)-pilot(DCF42)
11	135k84	-92 (e), -95 (i) -89 (k) -93 (o) -93 (p)	200	-	Either SXV, Spata Attikis, 37N58 23E55; 37dBW, 1kHz F1B, or SXA, Athinai, 37N55 23E49, 40dBW, 100 Hz A1A, 400 Hz F1B	2-Tone-FSK type A 1816km/132deg
	136k040				Mainflingen Intermodulation Product	2*space(DCF49)-pilot(DCF42)
10	137k0??	-90 (c)	200	-	Possibly CFH, Halifax, 44N58 63W59 44dBW, 400 Hz F1B	Before 2-Tone-FSK type A now MSK 5252km/293deg
	137k420	-89 (c) -100 (e)	200 50	-		carrier
9	138k830	-61 (i) -60 (o) -61 (p)	50	-	DBF 39, RC signal, Burg [DET]	mark frequency

#	Hz	dBm	IF-BW	bearing	station	remarks
	141k400	-100 (i) -95 (k) -91 (l)	200	-	not identified (from Denmark or Greece)	FSK
8	144k6305	-86 (i) -82 (k) -82 (l) -87 (o) -88 (p)	200	-	»datatrak« station	CW bursts
	145k0	-81 (n)	200	-		2-Tone-FSK type A
7	146k475	-99 (i) -96 (k) -92 (l) -97 (o) -100 (p)	200	-	»datatrak« station	CW bursts
6	146k75	-92 (e) -93 (o) -93 (p)	200	-		MSK?
5	147k3	-73 (i) -70 (k) -73 (o) -74 (p)	300	16	DDH 47, Pinneberg, Hamburg Meteo, 53N41 09E41, 31.8 dBW, 100 Hz A1A, 500 Hz F1B	2-Tone-FSK type A 415km/11deg
	153k000	-33 (i)	200	-	DLF, Donebach (day/night 500/250 kW) [DET]	AM audio, only carrier measured

Nomenclature

Hz frequency in Hz, accuracy determined to the hundred of Hz by tuning, to the tens Hz by aural comparison with DCF77 (same beat note), to the Hz by references (books).

dBm indicated receiver input level

»a«	received on May 02/1998	LW3	07:00 - 07:55 UTC
»b«	received on May 07/1999	V1(4)	21:05 - 21:55 UTC
»c«	received on May 10/1999	V1(4)	01:18 - 01:41 UTC
»d«	received on May 10/1999	V1(4)	16:45 - 17:00 UTC
»e«	received on Sep 04/1999	V1(4)	19:06 - 20:10 UTC
»f«	received on Dec 09/1999	V1(4)	23:14 - 23:20 UTC
»g«	received on Sep 10/1999	V1(4)	01:45 - 01:47 UTC
»h«	received on Jan 12/2000	V2(1)	21:57 - 22:08 UTC
»i«	received on Jul 16/2000	V2(1)	21:37 - 21:48 UTC
»j«	received on Jul 22/2000	V2(1)	12:30 - 13:15 UTC
»k«	received on Jul 22/2000	V2(1)	20:41 - 20:57 UTC
»l«	received on Jul 23/2000	V2(1)	01:57 - 02:09 UTC
»m«	received on Sep 04/2000	V2(1)	19:55 UTC
»n«	received on Sep 17/2000	V2(1)	23:07 UTC
»o«	received on Oct 02/2000	V2(1)	17:50 - 18:30 UTC
»p«	received on Oct 04/2000	V2(1)	20:05 - 20:26 UTC

Antenna type:

»LW3« = magnetic, tuned, active antenna made by Grahn, used indoors

»V1(4)« = electric, broadband, active antenna, ARA60 made by Dressler, used outdoors on top of a 4m pole

»V2(1)« = electric, broadband, active antenna made by DL4KH, used outdoors on top of a 1m pole, earthed there

IF-BW the IF bandwidth in Hz, using CW demodulation (BFO = +700 Hz)

bearing relative bearing obtained with magnetic antenna (LW3)

station stations identification

infos drawn either from Gerd Klawitter, »Lang- und Laengstwellenfunk«, 3rd edition 2000, ISBN 3-89632-043-2
or from Alan Gale [alan.gale@zen.co.uk], »ELF/VLF/LF UTILITY STATIONS 0 to 200kHz REPORTED IN VARIOUS PUBLICATIONS:«, Last updated: 13/12/96, Compiled by Alan Gale
or from Trond Jacobsen [trond.jacobsen@halden.net]

»[DET]« more detailed station/spectrum data available on request

remarks modulation mode

infos drawn either from Gerd Klawitter, »Lang- und Laengstwellenfunk«, 3rd edition 2000, ISBN 3-89632-043-2
or from Alan Gale, »ELF/VLF/LF UTILITY STATIONS 0 to 200kHz REPORTED IN VARIOUS PUBLICATIONS:«, Last updated: 13/12/96, Compiled by Alan Gale
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Designation of Emissions (ITU, Radio Regulations, Article 4)

First Symbol

N	Emission of an unmodulated carrier
A	AM Double-sideband
H	AM Single-sideband, full carrier
R	AM Single-sideband, reduced or variable level carrier
J	AM Single-sideband, suppressed carrier
B	AM Independent sidebands
C	AM Vestigial sideband
F	Frequency modulation
G	Phase modulation
D	Emission in which the main carrier is amplitude-and angle-modulated either simultaneously or in a pre-established sequence
P	Sequence of unmodulated pulses P
K	A sequence of pulses modulated in amplitude
L	A sequence of pulses modulated in width/duration
M	A sequence of pulses modulated in position/phase
Q	A sequence of pulses in which the carrier is angle-modulated during the period of the pulse
V	Which is a combination of the foregoing or is produced by other means
W	Cases not covered above,in which an emission consists of main carrier modulated, either simultaneously or in a pre-established sequence, in a combination of two or more of the following modes: amplitude, angle, pulse
X	Cases not otherwise covered

Second Symbol

0	No modulating signal 0
1	A single channel containing quantized or digital information without the use of modulating subcarriers
2	A single channel containing quantized or digital information with the use of a modulating sub-carrier
3	A single channel containing analogue information
7	Two or more channels containing quantized or digital information
8	Two or more channels containing analogue information
9	Composite system with one or more channels containing quantized or digital information together with one or more channels containing analogue information
X	Cases not otherwise covered

Third Symbol

N	No information transmitted
A	Telegraphy-for aural reception
B	Telegraphy-for automatic reception
C	Facsimile
D	Data transmission,telemetry,telecommand
E	Telephony (including sound broadcasting)
F	Television (video)
W	Combination of the above
X	Cases not otherwise covered

Examples

A1A	AM Double-sideband	A single channel containing quantized or digital information without the use of modulating subcarriers	Telegraphy-for aural reception
A1B	AM Double-sideband	A single channel containing quantized or digital information without the use of modulating subcarriers	Telegraphy-for automatic reception
B8E	AM Independent sidebands	Two or more channels containing analogue information	Telephony (including sound broadcasting)
F1B	FM	A single channel containing quantized or digital information without the use of modulating subcarriers	Telegraphy-for automatic reception
G7D	phase modulation	Two or more channels containing quantized or digital information	Data transmission,telemetry,telecommand