

APPENDIX G

TYPICAL CONTRIBUTION QUALITY RADIO MICROPHONE

The following information is supplied by courtesy of Audio Engineering Ltd, manufacturers of MICRON radio microphones.

RF TRANSMISSION SYSTEM

Carrier frequency range (to order)	150 to 950 MHz
Switched frequency options	UHF 2 - frequencies VHF 3 - frequencies
Switching range	VHF 1.2 MHz UHF 4.5 MHz
Modulation system	100F3EGN
Pre/de-emphasis	50 μ S
Minimum channel spacing	200 kHz
Deviation at ALC threshold	15 kHz \pm 1.0 dB
Companding system	CNS

TRANSMITTER



PEAK SIGNAL TO NOISE RATIO (RMS A weighted, measured at receiver high level output)

CNS Strong signal (Tx input terminated)	>100 dB
CNS Frequency response	50 to 16 kHz \pm 2dB

AUTOMATIC LEVEL CONTROL SYSTEM

Gain control range:	automatic 50 dB manual 40 dB
Attack time	25 mS/10 dB
Recovery time:	transient overload 10 dB/S sustained overload 0.5 dB/S
Distortion (1 kHz tone @ 40 dB overload)	<0.3 % THD

Note: ALC system allows short transients to pass (up to + 6 dB).

CONTROLS

Line-up tone enable	push button
ALC disable/Volume indicator enable	latching push button
SET level (modulation sensitivity)	Screwdriver pre-set
Battery test	line up tone button + ALC button
'0' light	>7.6 V
'-10' light	>7 V
Both lights flash	<6.5 V
Transmitted low-battery early warning	Rx tuning indicator flashes at <6.5 V nominal

RECEIVER

Adjacent channel rejection	>90 dB
Muting level	0.7 μ V



APPENDIX H

TYPICAL CONTRIBUTION QUALITY HIGH POWER AUDIO LINK

The equipment detailed in the following section is not readily commercially available, but was developed and built by the BBC.



The following information is supplied by courtesy of the BBC.

SPECIFICATION

Transmitter TM3P/9

RF output power (50 ohm)	1 or 4 watts nominal, switch selectable
RF output ($>\pm 100$ kHz from f_c)	<-65 dBc (harmonic & non-harmonic)
f_r accuracy	± 3 kHz
Input line-up sensitivity	
Range L	+18 to -12 dBu
Range 1	-10 to -40 dBu
Range 2	-40 to -70 dBu
Audio Processing	
Input filter: Switchable High Pass	Out
	150 Hz
	300 Hz > 20 dB/octave
Low Pass	15 kHz (>60 dB attenuation at 35 kHz)

Input peak limiter, applied signal, 20 dB above peak deviation at 1 kHz	
Attack time	+1.5 dB after 3.5 msec.
40 dB reduction in level	
Recovery time	nom. value (-1dB) after 1 second
Phantom power	+48 Vdc (14 mA limited), selected on sensitivity switch
Headphone Monitor	2 Vrms from 50 ohms source
Supply Current	400 mA typical (4 watts RF O/P) 290 mA typical (1 watt RF O/P)
Weight	1kg approx.

Receiver RC4P/10

RF input	500 mV maximum
Mute level	Adjustable, 1-200 μ V
AGC	300 μ V threshold, 40 dB range
Noise figure	≤ 9 dB
Audio output	+8 dBm unbalanced into 600 ohms for 15 kHz peak deviation at 100 Hz rate
Switchable line-up tone;	1 kHz, 0 dBm
Headphone Monitor	Variable level into high impedance
Supply current	400 mA typical
Weight	1kg approx.

Overall Link, Tx-Rx

(Transmitter set to deliver 0 dB RF out)

Line up tolerance	0 ± 1 dB
Frequency Response	50 Hz-12 kHz ± 0.75 dB
	40 Hz-15 kHz ± 1.0 dB (PPM '4')
	50 Hz-12 kHz ± 1.5 dB } (PPM '4')
	40 Hz-15 kHz ± 2.0 dB } (less 20 dB)
Total harmonic distortion	≥ 46 dB down on PPM '6'
Signal - Noise ratio	57 dB 4W @ 1 mV RF at Receiver I/P 43 dB 4W @ 20 μ V RF at Receiver I/P
Low battery indication	When battery pd. falls below 21.7 V, 19 kHz tone is transmitted which flashes the signal-strength bargraph on the receiver.
Operating temperature	-10° C to +40° C

APPENDIX I

TYPICAL HIGH POWER NON CONTRIBUTION QUALITY AUDIO LINK

The following information is supplied by courtesy of Sound Broadcast Services.

TRANSMITTER

Transmitter Power level	0 to 5 watts
Frequency Range *	800 - 900 MHz
Power output variation	+10 %/-2 %
Output Impedance	50 Ohms
Harmonic and spurious outputs	<-60 dBc
Input Voltage range	230 V _{ac} ±10 %
Input Sensitivity for 75 kHz deviation	-10 to + 20 dBm
Audio frequency response (no pre-emphasis)	±0.5 dB (5 Hz - 100 kHz)
Audio frequency response relative to 50 µS curve	±0.5 dB (50 Hz - 15 kHz)
Total harmonic distortion	<0.2 % (typ. 0.17%)

* Broadcast transmitter design is usable over any 15 MHz band, between 800 - 900 MHz (in 50 kHz steps) without tuning.

Option version allows broadcast transmitter or other equipment to be controlled via a link.

RECEIVER

Input Impedance	50 Ohms
Sensitivity for 10 dB SINAD	3 uV
S/N Ratio @ 1mV input	-72 dB (50 Hz-15 kHz)
Minimum Sensitivity for carrier detect.	20 µV
Audio Output at 75 kHz deviation	-20 to +10 dBm
Audio distortion	<0.2 %
Input voltage	230 V _{ac} ±10 %

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APPENDIX J

**TYPICAL CONTRIBUTION QUALITY HIGH POWER AUDIO LINK WITH NARROW BAND
CUE RECEIVER**

The following information is supplied by courtesy of Sennheiser



TRANSMITTER

Frequency range	580 - 790 MHz
Selectable frequencies	max. 16
Switching Bandwidth	185 MHz
RF output Power into 50 Ohm	3 W and 1 W switchable
Frequency stability (-10°C to +65°C)	$\leq \pm 2.5$ kHz
Suppression of spurious and harmonics	>85 dB
Spurious and harmonic emission	≤ 10 nW

RECEIVER

Frequency range	470 - 526 MHz
Switchable frequencies	max. 16
Switching bandwidth	approx. 17 MHz
Intermediate frequencies	21.4 MHz, 62.3 MHz
Channel spacing	20 kHz minimum
Nominal deviation (= peak deviation)	2.8 kHz
De-emphasis	6 dB/octave
AF output voltage at nominal swing	1.55 V into 600 Ohm
Frequency response (-3 dB)	300 Hz to 3 kHz
Audio distortion at nominal swing and 1 kHz Modulation Frequency	3% (typ. 1%)
Compandor System	HiDyn (defeatable)
Sensitivity for S/N = 26dB (nom. deviation, mod. frequency 1 kHz, CCITT)	1 μ V
S/N Ratio (CCITT, without HiDyn)	50 dB/300 μ V RF
S/N Ratio (Unweighted, with HiDyn)	80 dB/15 μ V RF
Adjacent channel rejection	70 dB
Image rejection	90 dB
Spurious rejection	66 dB
Interference radiation at antenna input	-70 dBm
Power requirements	10.5 - 15 V _{dc}
Current consumption	approx. 120 mA
Operating Voltage	
NiCad accu GZB 20	12 V/4 Ah
Battery life (3 W + receiver)	approx. 3 h
(1 W + receiver)	approx. 5.5 h
(receiver only)	approx. 25 h

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Radio Microphone Systems for a High Channel Density	by Stefan Frese, AKG Akustische, Vienna
Multichannel Radio Microphone Systems Heilbronn	by Kurt-Walter Rüdiger, Beyer dynamic,
Extension of the Dynamic Range of Radio Microphones	by Wilfried Pohl and Erhard Werner Sennheiser Electronic KG, Wedemark
Improvement of Multichannel Radio Microphone Operation by use of Advanced Receiver Techniques	by Erhard Werner, Sennheiser Electronic KG
Mobile Communications Engineer	by William C Y Lee
ETSI STC RES08 WG3 Spectrum Survey	
Multichannel Radio Microphone use	by John Wykes, Audio Engineering
BBC Engineering Design Information	by John Sykes, BBC
ETSI STC RES08 Working Group 3	