



**ROHDE & SCHWARZ
MÜNCHEN**

Instruction Book

**AMF-FM SIGNAL GENERATOR
SMDA**

100.4559.04

Table of Contents

1.	General	
1.1	Uses	95
1.2	Deskription	96
1.3	Specifications	97
1.4	Accessories Supplied	101
1.5	Recommended Extras	101
1.5.1	Specifications of Signal Generator with Frequenzkontroller 100.4542	102
1.5.2	Specifications of Signal Generator with Power Test Adapter 100.4620	103
1.5.3	Coupling Head 124.7558.50	104
1.5.4	Fixing Kit 082.5476.02	105
2.	Preparation for Use and Operation	
2.1	Table of Controls	107
2.2	Adjusting to the Local AC Supply Voltage	111
2.3	Adjusting the Zero of the Meter	112
2.4	Frequency Setting	112
2.4.1	Adjusting the Frequency of the RF Oscillator	112
2.4.2	Calibration of the Frequency Scale	112
2.4.3	Incremental Tuning	112
2.5	Output Voltage Adjustment	113
2.5.1	Setting the RF Output Voltage and Taking the Reading	113
2.5.2	Connecting the Load	113
2.5.3	Voltage at the Load	114
2.5.4	Power Consumption of the Load	114
2.5.5	Adjusting Extremely Small Output Voltages	115
2.5.6	Adapting the RF Output 16 to Other Connector Systems	116
2.6	Modulation Generator	116
2.6.1	Frequency Setting	116
2.6.2	Voltage Setting	116
2.7	Types of Modulation	117
2.7.1	Frequency Modulation	117
2.7.2	Phase Modulation	117
2.7.3	Amplitude Modulation	118
2.8	Frequency Deviation Measurement with Frequenzkontroller BN 413115	118
3.	Maintenance and Repair	
3.1	Measuring Instruments and Auxiliary Equipment Required	119
3.2	Performance Check	121
3.2.1	RF Output	121
3.2.1.1	Frequency	121
3.2.1.2	Checking the Output Voltage or Output Power	121
3.2.1.3	Measuring the Non-harmonic Spurious Waves	122
3.2.1.4	Measuring the Harmonics	122
3.2.1.5	Measuring the Residual FM	122
3.2.1.6	Measuring the Noise Voltage	123
3.2.2	Modulation Generator	125
3.2.2.1	Measuring the Frequency	125
3.2.2.2	Measuring the Output Voltage	125
3.2.2.3	Checking the Output-voltage Indication	125

3.2.2.4	Measuring the AF Distortion Factor	126
3.2.3	Modulation	126
3.2.3.1	Checking the Internal Amplitude Modulation	126
3.2.3.2	Checking the External Amplitude Modulation	127
3.2.3.3	Measuring the Spurious AM with Frequency Modulation	128
3.2.3.4	Measuring the Modulation Distortion with AM	128
3.2.3.5	Checking the Internal Frequency Modulation	129
3.2.3.6	Checking the External Frequency Modulation	130
3.2.3.7	Measuring the Modulation Distortion with FM	130
3.2.3.8	Checking the Phase Modulation	131
3.2.3.9	Checking the Level Adjustment Frequency of the Phase Modulation	131
3.2.3.10	Checking the AF Response with Phase Modulation	131
3.2.3.11	Measuring the Modulation Distortion with φM	131
3.2.3.12	Checking the Response Threshold of the Maximum Frequency Deviation Indication	131
3.2.3.13	Checking the Automatic IF Generation	132
3.2.4	Measuring the Voltage at RF Output II	132
3.2.5	Measuring the AF Distortion Factor	132
3.2.6	Measuring the Frequency Deviation in Sweep Operation	132
3.2.7	Measuring the RF Leakage	133
3.2.7.1	Determination of the Receiver Sensitivity	133
3.2.7.2	Measuring the RF Leakage	133
3.2.8	Checking the Output Voltage on the VOR-ILS Unit	134
3.3	Mechanical Maintenance	134
3.3.1	Cleaning	134
3.3.2	Withdrawing the Chassis from the Cabinet	135

4. Circuit Description

4.1	Oscillator and Frequency Modulator	137
4.2	FM Chokes	137
4.3	Deviation Network	137
4.4	Buffer	137
4.5	AGC Circuit	137
4.6	Frequency Converter	138
4.7	Low-pass Filter Preceding the Mixer	138
4.8	Mixer	138
4.9	Low-pass Filter Following the Mixer	138
4.10	Crystal Stage	138
4.11	Second-output Amplifier	138
4.12	Modulator	139
4.13	Output Stage and Output Filter	139
4.14	Attenuator	139
4.15	Overload Protector	139
4.16	AGC Amplifier	140
4.17	Modulation Unit	140
4.18	Power Supply	141
4.19	Mechanical Construction	142
4.19.1	Removing the Operating Controls	142
4.19.2	Withdrawing the Modulation Unit	142
4.19.3	Opening the Oscillator and Replacing the Oscillator Segments	142
4.19.4	Withdrawing the RF Attenuator and the AGC Amplifier	143
4.19.5	Withdrawing the Overload Protector	143
4.19.6	Withdrawing the Power Supply	143

4.19.7	Withdrawing the Crystal Stage	144
4.19.8	Withdrawing the FM Chokes	144
4.19.9	Withdrawing the Pushbutton Assembly and the Deviation Network	144
4.19.10	Withdrawing the Amplifier	144
4.19.11	Withdrawing the Buffer, AGC Circuit, Mixer, Modulator, Output Stage	144
5.	Repair Instructions	
5.1	Measuring Instruments and Auxiliary Equipment Required	145
5.2	Trouble-shooting	147
5.2.1	Power Supply	147
5.2.2	RF Voltage	147
5.2.3	Modulation Unit	148
5.3	Performance Check of Subassemblies	148
5.3.1	Power Supply	148
5.3.2	Oscillator	149
5.3.3	FM Chokes and Operating-voltage Leads	151
5.3.4	Buffer and AGC	151
5.3.5	Mixer	152
5.3.6	Crystal Stage	153
5.3.7	Second-output Amplifier	153
5.3.8	Buffer and Modulator	154
5.3.9	Output Stage	154
5.3.10	Filter	155
5.3.11	Attenuator	155
5.3.12	AGC Amplifier	156
5.3.13	Overload Protector	158
5.3.14	Modulation Generator (in the Modulation Unit)	159
5.3.15	Meter Amplifier (in the Modulation Unit)	159
5.3.16	Deviation Network	159
5.3.17	Connectors for the Frequenzkontroller	160
5.4	Trimming Instructions	160
5.4.1	Power Supply	160
5.4.2	Oscillator	160
5.4.3	Frequency Modulation	164
5.4.4	AGC Amplifier	164
5.4.5	Modulator	165
5.4.6	Crystal Stage	165
5.4.7	Overload Protector	165
5.4.8	Modulation Generator	166
5.4.9	Meter Amplifier	166
5.4.10	Automatic IF Generation	167
5.4.11	Mixer	167
5.5	Calibration of the Subassemblies	167
5.5.1	Oscillator: Zero Beat in Frequency Range I	167
5.5.2	Attenuator	167
5.5.3	Calibrating the Fine Tuning of the Modulation Frequency	169

Appendix

Fig. 1-2 Block diagram 171

Fig. 2-1 Front panel 173

Fig. 2-2 Rear panel 173

Fig. 4-1 Bottom view, cabinet removed 175

Fig. 4-2 Top view, modulation generator with drawn 177

Fig. 4-3 Top view, cabinet removed 179

Fig. 4-4 Rear view, cabinet removed 179

Fig. 4-5 Left-hand side view, cabinet removed 181

Fig. 4-6 Right-hand side view, cabinet removed 181

Fig. 4-7 Oscillator 183

Fig. 5-16 Level diagram 185

Table 18 List of subassemblies and component parts 187

Circuitry documentation (see separate index) 189