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SPECIFICATION FOR RADIO APPARATUS: VHF AND UHF FIXED SERVICE USING ANGLE MODULATION WITH 25 kHz OR 50 kHz CARRIER FREQUENCY SEPARATION

Radio Spectrum Management Group

Ministry of Economic Development

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1. SCOPE

This Specification covers the minimum requirements for angle modulated equipment operating in the VHF and UHF fixed services with channel spacings of 25 kHz or 50 kHz. This specification does not include all characteristics which may be required by a user, nor does it represent the maximum performance achievable.

2. MECHANICAL AND ELECTRICAL DESIGN

The performance, construction and finish of the equipment shall conform to good standards of engineering practice.

All controls for aligning and adjusting the circuits shall be of the pre-set type. It shall not be possible to obtain access to, or alternatively to adjust, such controls without the use of tools.

All components used in the equipment shall operate within the component manufacturers' ratings.

3. BASIC OPERATIONAL REQUIREMENTS

3.1 Class of Emission

The equipment shall transmit and/or receive angle modulated emissions only.

3.2 Frequency Range

The equipment shall meet the requirements of this specification on any channel in the band for which it obtains compliance.

3.3 Method of Operation

The equipment may be designed for multi-channel operation where a single RF carrier is modulated by one or more multiplexed information channels.

Technical details of modulation and multiplexing shall be supplied by the submitter.

3.4 Synthesisers and Phase-Locked-Loop Systems

If use is made of a synthesiser and/or a phase-locked-loop system for determining the transmitter frequency, the transmitter shall be inhibited when synchronisation is absent.

3.5 Power Output

The power output of the equipment shall be adjustable from 50 milliwatts to the maximum power of the device. The maximum power output shall not exceed the limits in clause 5.1.

4. STANDARD TEST CONDITIONS

4.1 General

Standard test conditions are those conditions which shall apply for the purpose of testing for the minimum requirements according to this specification. They are identified throughout the specification by initial capital letters, and are defined in the following clauses.

During compliance testing the power supply for the equipment shall be provided by a test power source capable of producing normal and extreme test voltages as specified in clauses 4.2 and 4.4. The internal impedance of the test power source shall be low enough for its effects on the test results to be negligible.

4.2 Standard Test Voltage

The Standard Test Voltage shall be measured at the point of connection of the power supply to the equipment. If the equipment is provided with a permanently connected power cable, the test voltage shall be measured at the junction of the permanently connected power cable and the power supply cable. For equipment in which batteries are incorporated, the test power source shall be applied as close to the battery terminals as practicable.

The Standard Test Voltage shall be as follows:

4.2.1 Mains Voltage

The Standard Test Voltage shall be 230 volts ± 2%. The frequency shall be between 49 and 51 Hz.

4.2.2 Lead-Acid Battery Source

Where radio equipment is intended for operation from a lead-acid battery, the Standard Test Voltage shall be 1.1 times the nominal voltage of the battery (6 volts, 12 volts etc).

4.2.3 Nickel-Cadmium Battery

Where the equipment is intended for operation from a nickel-cadmium battery, the Standard Test Voltage shall be the nominal voltage of the battery (1.2 volts per cell).

4.2.4 Other Power Sources

For operation from other power sources or types of battery (primary or secondary), the Standard Test Voltage shall be that declared by the submitter as being appropriate for the particular equipment and type of battery.

4.3 Standard Ambient Temperature

For the duration of the tests the Standard Ambient Temperature shall be a temperature between +15 degrees Celsius and +30 degrees Celsius except where otherwise specified.

4.4 Extremes of Supply Voltage and Ambient Temperature

4.4.1 General

Equipment shall, where specified, be tested under the conditions of supply voltage and ambient temperature specified in this clause.

4.4.2 Supply Voltage

Where the equipment is capable of being operated from more than one type of power supply or battery it shall meet the requirements of this specification for each type of supply or battery.

4.4.2.1 Mains voltage

The Extreme Test Voltages for equipment to be connected to an AC mains source shall be the Standard Test Voltage ± 10%. The frequency of the test power source shall be between 49 and 51 Hz.

4.4.2.2 Lead-acid battery source

Where the equipment is intended for operation from a lead-acid battery power source, the Extreme Test Voltages shall be 1.25 and 0.9 times the nominal voltage of the battery (6 volts, 12 volts etc).

4.4.2.3 Nickel-cadmium battery

Where the equipment is intended for operation from a nickel-cadmium battery, the Extreme Test Voltages shall be 1.25 and 0.85 times the nominal voltage of the battery.

4.4.3 Extreme Temperatures

Tests at extreme temperatures shall be made at -10 degrees Celsius and at +40 degrees Celsius.

Measurements to ensure that the equipment's basic operational parameters are within limits under the terms of this paragraph shall be made under the following conditions:

(a) The equipment shall be placed in a temperature controlled chamber and the temperature shall be reduced to -10 degrees Celsius and shall remain at this value for at least one hour, or until thermal equilibrium is attained. The equipment shall be switched off during the temperature stabilising period.
The equipment shall be switched on for 10 minutes in the receive condition and the parameters then measured at Standard Test Voltage and at the Extremes of Supply Voltage. The requirements of this specification shall be met at all times after the initial 10 minutes of operation.

(b) The temperature of the equipment shall be maintained at Standard Ambient Temperature and the parameters measured at Standard Test Voltage and at the Extremes of Supply Voltage.

(c) The equipment shall be placed in a temperature controlled chamber and the temperature shall be increased to +40 degrees Celsius and shall remain at this value for at least one hour, or until thermal equilibrium is attained. The equipment shall be operated at Standard Test Voltage and in the receive condition for the whole of this period. The parameters shall then be measured at Standard Test Voltage and at the Extremes of Supply Voltage. In the case of transmitter measurements these shall follow 10 minutes of continuous, unmodulated emission at the Standard Test Voltage.

4.5 Standard Test Modulation

The Standard Test Modulation shall be declared by the submitter and shall be agreed between the submitter and the testing authority as being suitable for the particular equipment and its intended use.

If the equipment is designed for multi-channel use as in clause 3.3, the Standard Test Modulation shall reflect that use.

4.6 Standard Test Load

The transmitter Standard Test Load shall be a 50 ohm resistance.

4.7 Standard Test Signal

The Standard Test Signal to be applied to the receiver shall be declared by the submitter and shall be agreed between the submitter and the testing authority as being suitable for the particular equipment and its intended use.

Some equipment may require more than one Standard Test Signal.

If the equipment is designed for multi-channel use, the Standard Test Signal shall reflect that use.

4.8 Source Impedance

The receiver shall be fed from a source impedance of 50 ohms resistive.

4.9 Receiver Test Signal Input Arrangements

4.9.1 Single Signal

The level of the signal applied to the receiver input shall be expressed in terms of the power delivered by the signal generator when terminated by a 50 ohm resistance. The nominal output impedance of the signal generator shall be 50 ohms resistive.

4.9.2 Two or Three Simultaneous Signals

A four port combining network shall be used for the simultaneous application of the outputs of two or three signal generators to the input of the receiver. The nominal output impedance of the signal generators shall be 50 ohms resistive. When only two signal generators are used the unused port shall be terminated by a 50 ohm resistance.

The level of the signals applied to the receiver input shall be expressed in terms of the power delivered by the particular signal generator to a 50 ohm resistive load connected in place of the receiver input terminals. The loss in the combining network must be taken into account.

Other arrangements such as hybrid junctions may be used to connect signal generators to the receiver input provided that adequate isolation between the generators is obtained.

4.10 Standard Output Power (Receiver)

The receiver Standard Output Power to be used during tests to this specification shall be declared by the submitter and shall be measured in a resistive load equal to the nominal impedance of the load normally connected to the receiver.

4.11 SINAD ratio

The SINAD ratio at the receiver audio output is defined as the ratio of the signal plus noise plus distortion to noise plus distortion.

4.12 Nominal Tune Frequency

The Nominal Tune Frequency shall be taken to mean the centre frequency of the channel on which the equipment is intended to operate.

4.13 Standard Test Receiver

The Standard Test Receiver consists of a mixer, an IF filter, an oscillator, a variable attenuator, an amplifier and an rms value indicator. (Note: The attenuator should precede the amplifier to obtain maximum dynamic range for the adjacent channel power measurement.) The technical characteristics of the Standard Test Receiver are given below.

4.13.1 IF Filter

The IF filter shall be within the limits of the selectivity characteristic shown in fig 1.

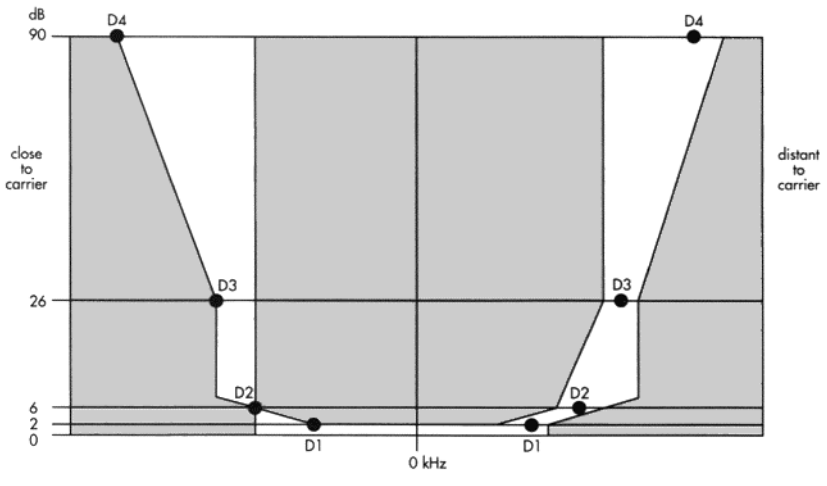

Figure 1

The selectivity characteristic of the filter shall be defined by values of frequency separation given in the following table:

Frequency separation of filter curve from nominal centre frequency of adjacent channel (kHz)				
	D1	D2	D3	D4
	5.00	8.00	9.25	13.25

The attenuation points shall not exceed the following tolerances:

	Tolerance Range (kHz)			
Attenuation Points	D1	D2	D3	04
Close to Carrier	+3.1 -0.0	±0.1	+0.00 -1.35	+0.00 -5.35
Distant from Carrier	±3.5	±3.5	±3.5	+3.5 -7.5

The minimum attenuation of the filter outside the 90 dB attenuation points shall be equal to or greater than 90 dB.

4.13.2 Attenuation Indicator

The attenuation indicator shall have a minimum range of 80 dB and a reading accuracy of 1 dB.

4.13.3 RMS Value Indicator

The instrument shall indicate accurately non-sinusoidal signals in a ratio of up to 10:1 between peak value and rms value.

4.13.4 Oscillator and Amplifier

The oscillator and the amplifier shall be designed in such a way that the measurement of the adjacent channel power of a low noise unmodulated transmitter, whose self noise has a negligible influence on the measurement result, yields a measured value of less than -80 dB relative to the IF carrier resulting from the heterodyning of the unmodulated transmitter carrier with the oscillator.

4.14 Test Fixture

The submitter may be required to supply a test fixture to allow relative measurements to be made on the submitted sample.

The test fixture shall provide a 50 ohm radio frequency terminal at the working frequencies of the equipment, a means of making external connections to the modulation input and audio output, and of replacing the power source with an external power supply.

The performance characteristics of this test fixture under normal and extreme conditions shall be subject to agreement between the submitter and the testing authority.

4.15 Channel Spacing

The submitter shall declare the channel spacing to be used during the tests to this specification (ie 25 kHz or 50 kHz).

4.16 Frequency Deviation

The submitter shall declare the maximum frequency deviation of the carrier.

5. TRANSMITTER PERFORMANCE

5.1 Power Output

5.1.1 Method of Measurement

The transmitter shall be connected to the Standard Test Load and the carrier power delivered by the transmitter to this load shall be measured under the conditions of clauses 4.2, 4.3 and 4.4.

5.1.2 Limit

The measured carrier power shall not exceed the limits shown in the following table:

Transmitter Equipment	At Standard Test Voltage & Standard Ambient Temperature (clause 4.2 & 4.3)	At Extremes of Supply Voltage and Ambient Temperature (clause 4.4)
VHF	25 Watts	33 Watts
UHF	50 Watts	66 Watts

5.2 Accuracy and Stability of Carrier Frequency

5.2.1 Method of Measurement

The carrier frequency shall be measured in the absence of modulation with the transmitter connected to the Standard Test Load. The measurement shall be made under Standard Test Conditions. The conditions of clause 4.4 shall apply.

5.2.2 Limit

The difference between the measured carrier frequency and the Nominal Tune Frequency shall not exceed the limits shown in the following table:

Frequency Error (kHz)		
30 - 100 MHz	100 - 300 MHz	300 - 1000 MHz
±1.5	±2.0	±2.5

5.3 Unwanted Power in Adjacent Channels

5.3.1 Deftnition

The unwanted power in adjacent channels shall be that part of the total power output of a transmitter, under defined conditions of modulation, which falls within a specified passband. For 25 kHz channels, the passband is centred on the nominal frequency of either of the adjacent channels. For 50 kHz channels, the passband is centred 12.5 kHz below the centre frequency of the upper adjacent channel, or 12.5 kHz above the centre frequency of the lower adjacent channel.

5.3.2 Method of Measurement

The unwanted power in adjacent channels shall be measured with a Standard Test Receiver which conforms to clause 4.13 (referred to in this clause as the “receiver”).

Lower Adjacent Channel Power Measurement:

(a) The transmitter shall be operated at the carrier power determined in clause 5.1 at Standard Test Voltage and Standard Ambient Temperature (clauses 4.2 and 4.3). The output of the transmitter shall be linked to the input of the “receiver” by a connecting device such that the impedance presented to the transmitter is 50 ohms and the level at the “receiver” input is appropriate.

(b) With the transmitter unmodulated, the “receiver” local oscillator frequency shall be set to the sum of the transmitter carrier frequency and the “receiver” IF. The local oscillator frequency shall then be adjusted to obtain the maximum “receiver” output level. This level is the 0 dB reference. The receiver" attenuator setting and the reading of the “receiver” output level shall be recorded.

(c) The “receiver” local oscillator frequency shall be adjusted lower in frequency until the “receiver” output drops by 6 dB. The “receiver” local oscillator shall then be set a further 17 kHz (for 25 kHz channel spacing), or 30 kHz (for 50 kHz channel spacing), lower in frequency.

(d) The transmitter shall be modulated with the Standard Test Modulation at a level which is 20 dB higher than that required to produce 60% of the maximum permissible frequency deviation (clause 5.4.2).

(e) The “receiver” variable attenuator shall be adjusted to obtain the same “receiver” output as in step (b), or a known relationship to it.

(f) The ratio of the adjacent channel power to transmitter carrier power shall it be the difference between the attenuator setting in steps (b) and (e), corrected for any differences in the “receiver” output level.

Upper Adjacent Channel Power Measurement:

(a) The transmitter shall be operated at the carrier power determined in clause 5.1 at Standard Test Voltage and Standard Ambient Temperature (clauses 4.2 and 4.3). The output of the transmitter shall be linked to the input of the “receiver” by a connecting device such that the impedance presented to the transmitter is 50 ohms and the level at the “receiver” input is appropriate.

(b) With the transmitter unmodulated, the “receiver” local oscillator frequency shall be set to the difference between the transmitter carrier frequency and the “receiver” IF. The local oscillator frequency shall then be adjusted to obtain the maximum “receiver” output level. This level is the 0 dB reference. The “receiver” attenuator setting and the reading of the “receiver” output level shall be recorded.

(c) The “receiver” local oscillator frequency shall be adjusted higher in frequency until the “receiver” output drops by 6 dB. The “receiver” local oscillator shall then be set a further 17 kHz (for 25 kHz channel spacing), or 30 kHz (for 50 kHz channel spacing), lower in frequency.

(d) The transmitter shall be modulated with the Standard Test Modulation at a level which is 20 dB higher than that required to produce 60% of the maximum permissible frequency deviation (clause 5.4.2.).

(e) The “receiver” variable attenuator shall be adjusted to obtain the same “receiver” output level as in step (b), or a known relationship to it.

(f) The ratio of the adjacent channel power to transmitter carrier power shall be the difference between the attenuator setting in steps (b) and (e), corrected for any differences in the “receiver” output level.

5.3.3 Limit

The unwanted power in adjacent channels shall not exceed a value of 70 dB below the carrier, but need not be lower than 1 microwatt (-30 dBm).

5.4 Deviation Limiting

5.4.1 Method of Measurement

The emission shall be measured by a modulation meter capable of measuring the peak value of both positive and negative frequency deviation. The modulation meter shall also have a peak hold facility to measure the instantaneous peak deviation. The measurement shall include deviation due to any signalling tones, present with the test tone, and any harmonics and intermodulation products which may be produced in the transmitter.

With any signalling systems disabled, the Standard Test Modulation shall be applied to the input of the transmitter and shall be adjusted to produce a peak deviation of 60% of the maximum peak deviation declared by the submitter. The signalling systems, if any, shall then be enabled and shall remain in operation during this test.

The level of the test signal shall then be increased by 20 dB in one step. The instantaneous peak deviation at the time of the level increase (peak hold positive peak deviation) and then the steady state positive peak deviation after a settling period shall be observed. The test shall be repeated, measuring the negative deviation. If the signalling systems operate in the absence of normal modulation, this test shall also be made in that condition.

The test shall be repeated at a number of frequencies in the range 20 Hz to the maximum modulating frequency using the same levels as for the test at 1000 Hz.

5.4.2 Limit

The instantaneous peak and steady state deviations shall not exceed the manufacturers declared maximum frequency deviation at any frequency.

5.5 Spurious Emissions

Emissions at any frequency other than those of the carrier and the sidebands associated with normal modulation shall be considered as spurious, irrespective of whether radiation takes place via the antenna connector or by direct radiation from the circuit components and wiring.

5.5.1 Method of Measurement

Measurements shall be made with the transmitter unmodulated and with Standard Test Modulation applied. The conditions of clause 4.4 shall apply.

5.5.2 Limit

The power of individual spurious signals delivered by the transmitter to the antenna transmission line at any frequency separated from the carrier frequency by more than 38 kHz (25 kHz channel spacing) or 75 kHz (50 kHz channel spacing) shall not exceed -26 dBm. Spurious signals shall be measured up to a frequency equal to ten times the carrier frequency.

The emission of spurious signals by direct radiation shall be minimised.

6. RECEIVER PERFORMANCE

6.1 General

During all tests on the receiver any sensitivity controls (other than the audio power output control) available to the user shall be adjusted for maximum sensitivity. The automatic gain control system shall be allowed to function normally.

6.2 Sensitivity

6.2.1 Method of Measurement

A Standard Test Signal at the Nominal Tune Frequency shall be applied to the receiver input at a level of -101 dBm. The receiver shall be adjusted to produce Standard Output Power and the SINAD ratio shall be measured using a flat frequency response. The conditions of clause 4.4 shall apply.

6.2.2 Limit

The SINAD ratio measured at the receiver output shall not be less than 20 dB.

6.3 Selectivity

6.3.1 Method of Measurement

The selectivity shall be measured by a two-signal method in which two signal generators “A” and “B” are connected to the input of the receiver through an input network as specified in clause 4.9.2. Signal generator “A” shall be used to apply a Standard Test Signal at the Nominal Tune Frequency of the receiver. Signal Generator “B” shall be modulated with an appropriate tone to produce a deviation the same as the Standard Test Signal and shall be set initially at the frequency of the upper adjacent channel (+25 kHz for 25 kHz channel spacing and +50 kHz for 50 kHz channel spacing).

The Modulation Frequency of signal generator “B”, which shall be recorded in the test results, shall be agreed between the submitter and the testing authority as relating to the equipment tested in terms of channelling, modulation usage and bandwidth.

With signal generator “B” switched off in a manner which does not affect its output impedance, the output level of signal generator “A” shall be adjusted to produce a SINAD ratio of 20 dB at the receiver output. The receiver shall be adjusted to produce Standard Output Power.

Signal generator “B” shall then be switched on and its output level adjusted until the SINAD ratio at the receiver output is reduced by 6 dB. The ratio of the output levels of signal generators “A” and “B” shall be recorded.

The test shall be repeated with signal generator “B” set at the frequency of the lower adjacent channel.

6.3.2 Limit

In each case the ratio of the output levels of signal generators “A” and “B” shall not be less than 70 dB at Standard Ambient Temperature and 60 dB under the conditions of clause 4.4.

6.4 Blocking

6.4.1 Method of Measurement

Signal generators “A” and “B” shall be connected to the input of the receiver through an input network as specified in clause 4.9.2. With signal generator “B” switched off in a manner which does not alter its output impedance, a Standard Test Signal at the Nominal Tune Frequency shall be applied from signal generator “A” at a level of -101 dBm at the receiver input.

The receiver shall be adjusted to produce Standard Output Power. An unmodulated signal from signal generator “B” shall then be applied at various frequencies and at a level of -23 dBm at the receiver input simultaneously with the signal from signal generator “A”.

6.4.2 Limit

The signal from signal generator “B” at any frequency (other than spurious response frequencies) removed from the frequency of signal generator “A” by 200 kHz or more shall not cause the output power of the receiver to change by more than 3 dB, or the SINAD ratio to be less than 14 dB.

6.5 Spurious Responses

6.5.1 Method of Measurement

A Standard Test Signal at the Nominal Tune Frequency shall be applied to the receiver input at the level at which a 20 dB SINAD ratio at the receiver output is obtained. The receiver shall be adjusted to produce Standard Output Power. The input level shall then be increased by 70 dB and the frequency varied over the range from the lowest intermediate frequency to 1000 MHz.

6.5.2 Limit

At any frequency removed from the Nominal Tune Frequency by more than 25 kHz (25 kHz channel spacing) or 50 kHz (50 kHz channel spacing) the SINAD ratio at the output of the receiver shall be less than 20 dB.

6.6 Intermodulation Response

6.6.1 Method of Measurement

Signal generators “A”, “B” and “C” shall be connected to the input of the receiver through a network as specified in clause 4.9.2. The Standard Test Signal shall be applied to the receiver from signal generator “A” at the Nominal Tune Frequency and at the level required to produce a SINAD ratio of 20 dB at the receiver output.

The receiver shall be adjusted to produce Standard Output Power.

Signal generator “B” shall then be used to apply an unmodulated signal at a frequency 25 kHz (25 kHz channel spacing) or 50 kHz (50 kHz channel spacing) above the Nominal Tune Frequency; and signal generator “C” shall be used to apply a test signal modulated with an appropriate tone to produce a frequency deviation the same as the Standard Test Signal at a frequency 50 kHz (25 kHz channel spacing) or 100 kHz (50 kHz channel spacing) above the Nominal Tune Frequency.

The outputs of signal generators “B” and “C” shall be at the same level, and shall be increased until the SINAD ratio resulting from signal generator “A” is reduced by 6 dB. The frequency of signal generator “B” shall be adjusted slightly for the purpose of this test to produce maximum interference from intermodulation products.

This test shall be repeated with signal generators “B” and “C” set 25 kHz and 50 kHz (25 kHz channel spacing) or 50 kHz and 100 kHz (50 kHz channel spacing) respectively below the Nominal Tune Frequency.

6.6.2 Limit

The ratio of the output voltage of signal generator “B” or “C” to that of signal generator “A” shall not be less than 60 dB.

6.7 Spurious Radiation

The spurious signal power at the antenna connector, when terminated in its source impedance (clause 4.8), shall not exceed -47 dBm at any frequency. Radiation of spurious signals from components and wiring shall be minimised.

7. EQUIPMENT IDENTIFICATION

The serial number of the equipment, the name, the type of unit, the manufacturer's name and any other information required to identify the equipment shall be indelibly marked on the unit in a conspicuous and/or readily accessible location, and in a manner to ensure its permanency during the expected lifetime of the equipment in its normal environment.

8. SUPPLEMENTARY REQUIREMENTS FOR DATA MODULATED SYSTEMS

For equipment intended solely or partially for the transmission of data signals, the following clauses shall apply in lieu of, or in addition to, those applying to equipment intended for the transmission of speech.

4. STANDARD TEST CONDITIONS

4.14 Test Fixture

Where an encoder is not integral with the transmitter, the submitter shall supply an encoder which will accept the declared data inputs and provide an output suitable for driving the transmitter modulation input. The encoder shall also be suitable for driving the modulation input of a signal generator to provide a Standard Test Signal.

4.17 Normal Coded Test Signal

The Normal Coded Test Signal shall be a train of correctly coded signals. This signal shall be declared by the submitter and, shall be agreed between the submitter and the testing authority as being that signal which requires the greatest occupied bandwidth. Details of this test signal shall be included in the test report.

The encoder associated with the transmitter shall be capable of supplying the Normal Coded Test Signal. If possible, this should be continuous modulation for the duration of the measurements.

5. TRANSMITTER PERFORMANCE

5.2 Accuracy And Stability of the Carrier Frequency

5.2.1 Method of Measurement

In the case of direct FSK modulation, the “carrier frequency” shall be calculated as the average of the frequencies of the output signal measured during the transmission of the sequences s0 (being a sequence containing only “zeros”) and s1 (being a sequence containing only “ones”). The measurement shall be made under Standard Test Conditions. The conditions of clause 4.4 shall apply.

5.3.2.1 Adjacent Channel Power Measurement

(e) The transmitter shall be modulated with the Normal Coded Test Signal at a level required to produce the maximum permissible frequency deviation (clause 5.4.2).

5.4 Deviation Limiting

5.4.1 Method of Measurement

The emission shall be measured by a modulation meter capable of measuring the peak value of both positive and negative frequency deviation. The modulation meter shall also have a peak hold facility to measure the instantaneous peak deviation. This measurement shall include deviation due to any signalling tones present with the test tone, and any harmonics and intermodulation products which may be produced in the transmitter.

With any signalling systems disabled, the Normal Coded Test Signal shall be applied to the input of the transmitter and shall be adjusted to produce the maximum peak deviation declared by the submitter. The signalling systems, if any, shall then be enabled and shall remain in operation during this test.

The instantaneous positive and negative peak deviations shall be measured during the transition from no modulation to normal modulation.

The steady state positive and negative deviations shall also be measured.

The transmitter shall be modulated with the Standard Test Modulation (clause 4.5.2).

5.4.2 Limit

The instantaneous peak and steady state deviations shall not exceed the maximum declared deviation at any frequency.

5.5 Spurious Emissions

5.5.1 Method of Measurement

Measurements shall be made with the transmitter unmodulated and with Normal Coded Test Signal applied. The conditions of clause 4.4 shall apply.

5.5.2 Limit

The power of individual spurious signals delivered by the transmitter to the antenna transmission line at any frequency separated from the carrier frequency by more than 38 kHz (25 kHz channel spacing) or 75 kHz (50 kHz channel spacing) shall not exceed -26 dBm. Spurious signals shall be measured up to a frequency equal to ten times the carrier frequency.

The emission of spurious signals by direct radiation shall be minimised.