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USE OF OFFSET CARRIER TECHNIQUES IN RADIOTELEPHONY WITHIN AMSTERDAM FIR

1 — INTRODUCTION

Within the Amsterdam FIR, offset carrier technology is used to increase the range of several frequencies of ACC and FIC, specifically in the airspace above the North Sea and for the Amsterdam flight information service over land ("Amsterdam Information", frequency 124.300 MHz). An offset carrier is a deliberate upward or downward shift of the transmitter frequency from the published frequency, e.g. with 5 kHz. These carrier offsets are in accordance with the standards laid down in ICAO Annex 10. In order to receive these offset carrier transmissions, airborne VHF radiotelephony receivers must be compatible with the offset carrier technique. This AIC addresses the compatibility issues of airborne VHF radiotelephony receivers with offset carrier systems in use. See also AIC-A 10/07 d.d. 19 JUL 07.

2 — OFFSET CARRIER USE OVER THE NORTH SEA

The frequencies used in the airspace above the North Sea in the Amsterdam FIR and in the airspace above the Netherlands Concession Area ("Area V") in the London and Scottish FIRs, use three or more transmitters in offset carrier configuration. Furthermore, within the Centre sector, which will be introduced by the end of 2007, offset carriers will be re-used over several transmitters to achieve radio coverage at very low altitudes, down to 100 ft within large areas of the airspace over the North Sea.

3 — EFFECT OF MIXING OFFSET CARRIER SIGNALS

When an aircraft is operating within the range of two or more stations, individual transmissions combine in the airborne receiver to cause audio heterodynes having a minimum frequency of approximately 5 kHz. These heterodynes appear above the normal audio pass-band of the receiver and are normally not heard by the flight crew.

4 — SQUELCH / MUTING CIRCUITS

Airborne receivers that are fitted with muting or squelch circuits, commonly operate on the basis of a received noise measurement obtained by sampling part of the audio band above 4 kHz. In areas where offset carriers are used, the heterodynes will therefore be measured as noise and may cause the audio output of the receiver to be muted even though a perfectly adequate desired signal is present. In general, airborne receiver manufacturers recognise this possibility and provide additional circuitry which either detects the presence of heterodynes or operates directly on the level of the received carrier and hence lifts the mute.

Some commonly used aircraft receivers which employ carrier override techniques are set to operate at carrier input levels of typically 40 μ V EMF (-81dBm). This level is far in excess of that required to provide an adequate audio output and effectively causes the receiver to be de-sensitised when operating in an offset carrier environment and hence for ground-to-air communication to be lost.

5 — COMPATIBILITY

It is essential for the safe operation of aircraft that reliable air-to-ground communications are provided. Operators and aircraft owners are therefore requested to note that offset carrier systems are used for the provision of radio telephony service within the Amsterdam FIR and in the airspace over the Netherlands Concession Area, and that aircraft receivers must be compatible with these systems. In choosing aircraft receivers, preference should be given to those designs which maintain a high sensitivity when operating with offset carrier transmissions. Where a carrier override is provided within the mute circuitry to overcome the failure of noise operated mute circuits to function satisfactorily in the presence of audio heterodynes, it is recommended that the carrier override level be set as low as possible with an upper limit of 24 μ V EMF (-85 dBm). This level is compatible with the certification requirements contained within Eurocae minimum performance specification ED23B. It is also recommended that in choosing new radio equipment preference should be given to dual class (classes C and E) receivers. These receivers are compatible to the aforementioned offset carrier transmissions and are able to operate on 8.33 kHz spaced frequencies.

6 — CONTACT DETAILS

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