

**IARU REGION 1 VHF / UHF BEACONS**  
**A GUIDE TO GOOD PRACTICE**  
(Tel Aviv 1996, Lillehammer 1999 )

Beacon transmitters have long been used to indicate the presence of VHF openings and have contributed significantly to our knowledge of propagation. As numbers of beacons, particularly on 50MHz, is increasing rapidly and the amount of spectrum available for them is under pressure, it is important that beacon builders are aware of the technical parameters required, the reasons for them and the procedure to be followed to obtain an agreed frequency.

It is not intended that this document should specify the exact purpose of a beacon, its power level or the number of beacons in any country as this should be agreed within the national society concerned. It is also not intended to be applied rigorously to experimental beacons or beacons with a special purpose. It should however apply to the vast majority of VHF/UHF beacons for propagation monitoring purposes.

**1. CO-ORDINATION PROCEDURE.**

The existing requirement for co-ordination of regional beacons will be retained. For non co-ordinated beacons the beacon proposal should be agreed with the national society (with consultation with neighboring societies where appropriate) and a provisional frequency chosen. If the frequency is below 146 MHz or the beacon has an ERP of greater than 10W then the frequency should be submitted to the IARU VHF beacon co-ordinator to check for potential interference problems.

(See also section IXa of the Handbook)

**2. TRANSMISSION MODE**

Amplitude or Frequency shift keying (A1A or F1A) may be used. However for F1A the old standard of 850 Hz is too wide a shift for the number of beacons currently in use.

When F1A is used on frequencies above 52 MHz the frequency shift must be 400Hz, arranged so that the beacon radiates on its nominal frequency during the short period of carrier between sending its call and locator (see para 4). It then moves to "space", 400Hz below and then keys back to nominal for "mark". In this way the transmission sounds like A1A in a USB receiver.

In the 50 MHz band, where beacons are closely spaced, A1A is the preferred mode. If F1A is used it is recommended that the frequency shift be 250Hz.

Care must be taken to ensure that the transmission has very low levels of spurious signals, key clicks and phase noise as beacons are often located on good sites where the potential for interference is high.

**3. FREQUENCY SPACING**

All co-ordinated and notified beacons should operate within the beacon segment of the band plan and be on a frequency which is a multiple of the frequency spacings in the following table. For example, beacons in the 435 MHz band should be on 432.900, 432.902, 432.904 MHz etc.

Band	Freq. Spacing
50 MHz	1 kHz <sup>1</sup>
70 MHz	1kHz
145 MHz	1 kHz
435 MHz	2 kHz
1.3 GHz	5 kHz

[see also Technical Recommendation B.1 in Section VIb]

#### 4. MESSAGE

As beacons are often heard at very low signal levels together with spurious signals it is important the message is simple, unambiguous and repeated frequently. It is also necessary to have a short period of carrier for frequency checking purposes and to make it easy to distinguish the mark and the frequency when using FSK.

The beacon message should consist of a callsign, (for identification,) and a carrier of 10 seconds, (for signal strength measurement for propagation studies purposes.) The message may also contain other information if required, e.g. locator, automatic identification (on packet radio or some other means), antenna direction, (if the beacon switches between several antennas). The total message should not exceed 30 seconds. The keying speed should be approximately 12 wpm.

#### 5. OPERATION

Operation should be 24 hour continuous. This does not preclude beacons that switch to different beam headings or power levels on a regular basis. Switched beacons must be clearly identified as such and must be submitted to the IARU VHF Beacon Co-ordinator.

Beacon operators must try to ensure that the operational parameters of their beacons remain as stable as possible and that non operational periods are kept to a minimum.

#### 6. STATUS

It is important that the operational parameters and status of each beacon are widely known. The information should be sent to the IARU VHF beacon co-ordinator via the local beacon co-ordinator or spectrum manager at least once per annum or when the operational parameters are changed to ensure the IARU list is up to date.

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<sup>1</sup>

<sup>1</sup> In this band it is likely that the frequency spacing will need to be reduced to half these values if the number of beacons continues to grow at the present rates.