datum to the coverage limit, the PFE, PFN and CMN limits, expressed in angular terms, shall be allowed to linearly increase as follows:

(i) With distance along the runway centerline extended, by a factor of 1.2 for the PFE and PFN limits and to ±0.10 degree for the CMN limits.

(ii) With azimuth angle, by a factor of 1.5 at the ±40 degree and a factor of 2.0 at the ±60 degree azimuth angles for the PFE, PFN and CMN limits.

(iii) With elevation angle from + 9 degrees to + 15 degrees, by a factor of 1.5 for the PFE and PFN limits.

(iv) Maximum angular limits. The PFE limits shall not exceed ±0.25 degree in any coverage region below an elevation angle of + 9 degrees nor exceed ±0.50 degree in any coverage region above that elevation angle. The CMN limits shall not exceed ±0.10 degree in any coverage region within ±10 degrees of runway centerline extended nor exceed ±0.20 degree in any other region within coverage.

NOTE: It is desirable that the CMN not exceed ±0.10 degree throughout the coverage.

(f) Approach azimuth antenna characteristics are as follows:

(1) *Drift.* Any azimuth angle as encoded by the scanning beam at any point within the proportional coverage must not vary more than ±0.07 degree over the range of service conditions specified in § 171.309(d) without the use of internal environmental controls. Multipath effects are excluded from this requirement.

(2) *Beam pointing errors.* The azimuth angle as encoded by the scanning beam at any point within ±0.5 degree of the zero degree azimuth must not deviate from the true azimuth angle at that point by more than ±.05 degree. Multipath and drift effects are excluded from this requirement.

TABLE 10—APPROACH AZIMUTH ACCURACIES AT THE APPROACH REFERENCE DATUM

| Error type | System | Angular error (degrees) | |
|---|---|---|---|
| | | Ground subsystem | Airborne subsystem |
| PFE ..... | ±20 ft. (6.1m) [1] [2] | ±0.118° [3] .. | ±0.017° |
| CMN ..... | ±10.5 ft. (3.2m) [1] [2] [4] | ±0.030° .... | ±0.050° |

Notes:
[1] Includes errors due to ground and airborne equipment and propagation effects.
[2] The system PFN component must not exceed ±3.5 meters (11.5 feet).
[3] The mean (bias) error component contributed by the ground equipment should not exceed ±10 feet.
[4] The system control motion noise must not exceed 0.1 degree.
[5] The airborne subsystem angular errors are provided for information only.

(3) *Antenna alignment.* The antenna must be equipped with suitable optical, electrical or mechanical means or any combination of the three, to bring the zero degree azimuth radial into coincidence with the approach reference datum (for centerline siting) with a maximum error of 0.02 degree. Additionally, the azimuth antenna bias adjustment must be electronically steerable at least to the monitor limits in steps not greater than 0.005 degree.

(4) *Antenna far field patterns in the plane of scan.* On boresight, the azimuth antenna mainlobe pattern must conform to Figure 10, and the beamwidth must be such that, in the installed environment, no significant lateral reflections of the mainlobe exist along the approach course. In any case the beamwidth must not exceed three degrees. Anywhere within coverage the −3 dB width of the antenna mainlobe, while scanning normally, must not be less than 25 microseconds (0.5 degree) or greater than 250 microseconds (5 degrees). The antenna mainlobe may be allowed to broaden from the value at boresight by a factor of $1/\cos\theta$, where $\theta$ is the angle off boresight. The sidelobe levels must be as follows:

(i) *Dynamic sidelobe levels.* With the antenna scanning normally, the dynamic sidelobe level that is detected by a receiver at any point within the proportional coverage sector must be down at least 10 dB from the peak of the main beam. Outside the coverage sector, the radiation from the scanning beam antenna must be of such a nature that receiver warning will not be removed or suitable OCI signals must be provided.

(ii) *Effective sidelobe levels.* With the antenna scanning normally, the sidelobe levels in the plane of scan must be such that, in the installed environment, the CMN contributed by sidelobe reflections will not exceed the angular equivalent of 9 feet at approach reference datum over the required range of aircraft approach speeds.