

# RADIO FREQUENCY SYSTEMS



## RF SAFETY EXHIBIT AND CALBRATION STATEMENT

IWD48760

EXCERPT FROM MANUAL

### Maximum Permissible Exposure Limits



**THIS PRODUCT IS CATEGORICALLY EXCLUDED FROM ROUTINE ENVIRONMENTAL EVALUATION ACCORDING TO CFR 47, SECTION 1.1037.**

Signal repeaters like the 48760 bi-directional amplifier generate radio signals and thereby give rise to electromagnetic fields. The installer is expected to have a complete understanding of CFR Title 47, Sections 1.1307 and 1.1310. A brief discussion follows but is not intended to be a substitute. Additional information can also be obtained from OET Bulletin 65.

- ***Antenna installation should be performed by qualified technicians only.***
- ***Installation instructions are not optional and are for the purpose of satisfying FCC RF Exposure Compliance.***
- ***All antennas (donor and service) are to be fixed-mounted and physically secured to one location.***
- ***Non building-mounted donor antennas must be greater than 10 meters above ground.***
- ***Maximum gain for the donor antenna is 28 dB.***
- ***Maximum gain for service area antenna(s) is 3 dB + network losses.***
- ***Minimum separation to any body part of any person is 25cm.***

There are two types of antennas attached to this unit. The *donor antenna* is typically roof mounted and the *service antenna* is usually mounted in a publicly accessible area. Both antennas should be fixed mounted. Installation considerations for both of these will be discussed separately.

Donor antennas receive the base site TX signals and transmit the mobile TX signals back to the base site (uplink paths). These are typically mounted on rooftops or tower structures. The maximum output power of the uplink path is less than 500 mW (+27dBm). Section 1.307(b)(1) excludes from routine environmental evaluation, facilities, operations and transmitters that, according to Table 1 (titled "Cellular Radiotelephone Service"), are less than 1000W ERP for building mounted antennas and less than 1000W and greater than 10 meters above ground for non building-mounted antennas. As such, with maximum power from the uplink path at 500 mW (+27dBm) and a maximum antenna gain of 28 dB, the donor antenna installation will not exceed 1000 Watts (+60 dBm) and is categorically excluded.

However, according to Section 1.1307 (b)(1), the appropriate exposure limits of 1.1310 are applicable to all facilities, operations, and transmitters. Therefore, the MPE (Maximum Permissible Exposure) of Section 1.1310 applies to the donor antenna installation. OET Bulletin 65 provides methods of calculating power density based upon the ERP and distance. It would be impossible to cover every possible configuration in this manual. Likewise, it



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would be unreasonable to dictate the exact parameters of every installation; therefore, it is the responsibility of the qualified technician to know and ensure that Sections 1.1307 and 1.1310 of CFR Title 47 are being met.

Service antennas are also fixed mounted and covered by the same MPE considerations as the donor antenna. However, this assumes that the area is always general population/uncontrolled and that the minimum distance in most installations will be less than 3 feet. According to Table 1(B) of Section 1.1310, the power density at 894 MHz is  $0.596 \text{ mW/cm}^2$ . The maximum output power in the 48760 downlink (base to service area) is less than +27 dBm (500 mW). Assuming no feeder cable loss and a service area antenna gain of 3 dB, a safe minimum separation of 10 inches (25 cm) is required to stay within the MPE.

$$1.05 \times 1000 \text{ mW} / 3.14 \times 252 = 1050 / 1962.5 = 0.535 \text{ mW/cm}^2$$

Therefore, the service area antenna should be mounted such that no body part of any person may come closer than 10 inches (or 25 cm). The service area antenna gain is 4 dB in the example above, but may be increased to make up for cable and/or splitter or tap losses. For example, if a 2-way splitter is used to provide for two antennas in different parts of the service area, then the antenna gain may be increased to 6.6 dB to make up for the loss of the splitter 3.6 dB. The maximum service area antenna gain for any specific location can be calculated as follows:

3dB+ accumulated losses to the antenna.