

## RF SAFETY EXHIBIT AND CALIBRATION STATEMENT

**IWD48900**

EXCERPT FROM MANUAL

### Maximum Permissible Exposure Limits



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

Repeaters like the 48900 series 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.
- Maximum donor antenna gain is 28 dB.
- Non building-mounted donor antennas must be greater than 10 meters above ground.
- Maximum service area antenna ERP is 1.0 Watt.
- 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 composite power of the uplink path is 160 mW (+22dBm). 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 @ 160 mW (+22dBm) 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 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.

The following scenario is a typical rooftop installation in an uncontrolled area (worst-case) using a 18 dB gain donor antenna. The MPE @ 824 MHz is 0.549 mW per cm<sup>2</sup>. The uplink is being driven to its maximum output power (+22 dBm); the resultant ERP is +40 dBm or 10,000 mW. OET Bulletin 65 provides the following formula for calculating the power density with the EPA recommended factor for ground reflection:

$$1.05 \text{ ERP/} \pi R^2$$

Where R is the distance to center (of any body part of person).

Solving for 10,000 mW @ 3ft. (91.44 cm) we get a power density of 0.4 mW per cm<sup>2</sup>.

The Yagi antenna in this scenario must be mounted in such a way that no body part of any person may come closer than 3 feet in the direction of the main power beam. This will limit exposure to well within the MPE.

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 @ 894 MHz is 0.596 mW/cm<sup>2</sup>. The maximum power of the 48900 downlink (base to service area) is +22 dBm (160 mW). Assuming no feeder cable loss and a service area antenna gain of 8 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 parts of any person may come closer than 10 inches (or 25 cm). The service area antenna gain is 8 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 11 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: 8dB+ accumulated losses to the antenna.

### Field Tune-up, Alignment or Calibration

There is no field tune-up or calibration necessary. These units are aligned and calibrated at the time of manufacture and are designed to retain calibration throughout the life of the product.