APPENDIX 1. SAFE DISTANCE DETERMINATION

The following information can be used in establishing a minimum safe distance from the antenna for personnel near an operating airborne weather radar. The minimum safe distance is based upon the FCC's exposure limit at 9.3-9.5 GHz for general population/uncontrolled environments. This limit is 1 mW/cm^2.

(1) NEAR FIELD/FAR FIELD INTERSECTION.

The distance to the near field/far field intersection (R_i) can be computed by:

$$R_i = \frac{G * \lambda}{8 * \pi}$$

where:

R_i = Intersection distance from the antenna (in meters)
λ = Wave length (in meters)
G = Antenna gain (numeric)

(2) DISTANCE TO SAFE LIMIT.

For a far field power density of $PD_{SafeLimit}$, the distance from the antenna may be calculated by:

$$R_S = \sqrt{\frac{G * P}{40 * \pi * PD_{SafeLimit}}}$$

where:

R_s = The minimum safe distance (in meters)
P = Transmitted average power (in watts)
G = Antenna gain (numeric)
$PD_{SafeLimit}$ = Desired Safe Limit Power Density (in mW/cm^2)
Use a value of 1 mW/cm^2

(3) PROCEDURES.

The above formulas may be used to determine the minimum safe distance as follows;

a. Determine the distance (R_i) to the near field/far field intersection.
b. Determine the distance (Rs) to the Desired Safe Limit Power Density.
c. If the distance (R_s) determined in 3b above is less than (R_i) found in 3a above, use distance (R_i) as the minimum safe distance.
d. If the distance (R_s) determined in 3b above is greater than (R_i) found in 3a above, use distance (R_s) as the minimum safe distance.

(4) EXAMPLE.

a. The following data is for an RDR-1400C airborne weather radar.

Antenna Diameter:	18 inches (0.457 meters)
Transmitter Frequency:	9375 MHz
Wave Length:	0.032 meters
Pulse Length:	2.35 microseconds (search)
Pulse Repetition:	249 Hz
Peak Power:	10 kilowatts
Average Power:	5.85 watts (Peak*Pulse Length*Pulse Repetition)
Antenna Gain:	1259 (31db)

b. Calculations.

(1) Distance (R_i) to the near field/far field intersection.

$$R_i = \frac{1259 * .032}{8 * \pi}$$

R_i = 1.6 meters (5.3 feet)

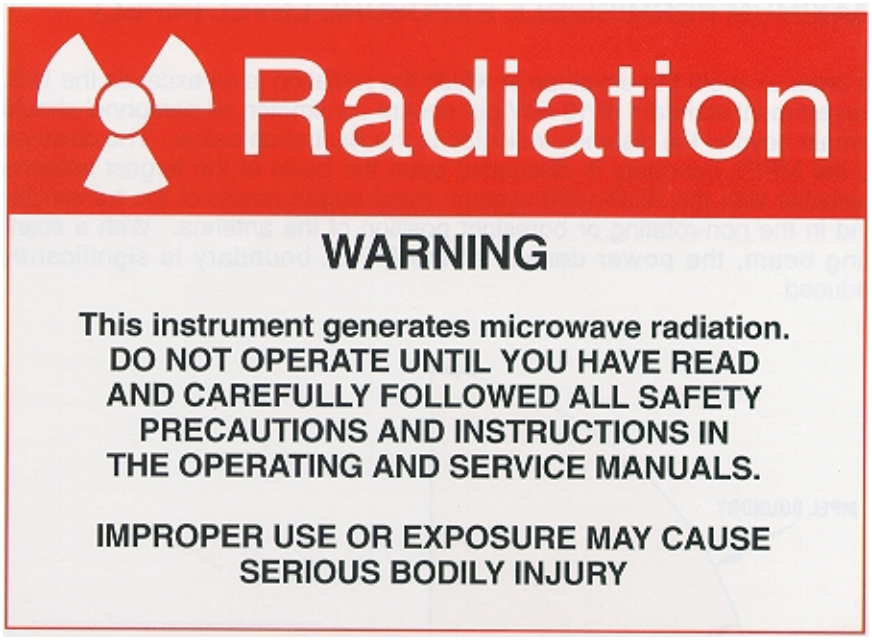
(2) Distance (R_s) to 1 mw/cm^2 safe limit.

$$R_S = \sqrt{\frac{1259 * 5.85}{40 * \pi * 1}}$$

R_s = 7.7 meters (25.1 feet)

(3) Safe Distance Determination.

The distance (R_s) is greater than (R_i), therefore, the minimum safe distance is 7.7 meters (25.1 feet).



CAUTION

a. MAINTAIN PRESCRIBED SAFE DISTANCE WHEN STANDING IN FRONT OF RADIATING ANTENNA.

b. NEVER EXPOSE EYES OR ANY PART OF THE BODY TO AN UNTERMINATED WAVE GUIDE.

MAXIMUM PERMISSIBLE EXPOSURE LEVEL (MPEL)

In order to avoid the envelope in which the radiation level exceeds the U.S. Government standard of 1 mW per square centimeter, all personnel should remain beyond the distance indicated in the illustration below. The distance to the MPEL boundary is calculated upon the basis of the largest antenna available with the RDR-1400C system, rated output power of the transmitter and in the non-rotating or boresight position of the antenna (see example calculations above). With a scanning beam, the power density at the MPEL boundary is significantly reduced.